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The Potential Role of Payment for Ecosystem Services in Protected Area Management in Rwanda: A Case Study from Gishwati-Mukura National Park

Yves Gakunde

ANTIOCH UNIVERSITY
NEW ENGLAND

Department of Environmental Studies

DISSERTATION COMMITTEE PAGE

The undersigned have examined the dissertation titled:

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Presented by Yves Pacifique Gakunde, candidate for the degree of Doctor of Philosophy and hereby certify that it is accepted*

Beth A. Kaplin, Ph.D., Committee Chair (Department of Environmental Studies, Antioch University New England)
Jean Kayira Ph.D., Committee Member (Department of Environmental Studies, Director, Doctoral Program, Antioch University New England)
Prof. Herman Musahara, Ph.D., Committee Member (Associate Professor, Researcher and Consultant, School of Economics, College of Business and Economics, University of Rwanda)

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*Signatures are on file with the Registrar's Office, Antioch University New England.

The potential role of payment for ecosystem services in protected area management in Rwanda:

A case study from Gishwati-Mukura national park

By

Yves Pacifique Gakunde

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Abstract

The demand for ecosystem services (ES) by communities around the world especially from developing countries is increasing, and creates conflict between protected ecosystem management and community socioeconomic wellbeing needs, particularly around protected areas. Taking into consideration globalization, capitalism, weak policies, and population growth as some of the majors driving factors to land change, increased demand for ES comes in part from societies' changing economic demands and opportunities, such as food and commercial crop production, timber extraction, urbanization, and infrastructural development. Many biodiversity conservation approaches and initiatives have been used to protect and maintain healthy ecosystems. While the fence and fine approach has been an instrumental tool in biodiversity conservation, it has decreased access to protected area (PA) resources and has contributed to conflicts between biodiversity conservation and the need to meet socioeconomic wellbeing of people living around PAs. This highlights the importance of local community participation in PA management to achieve effectiveness. The participatory approach has been instrumental in designing environmental markets such as Payment for Ecosystem Services (PES) approaches. However, there is a need to better understand how environmental markets such as PES can be used for effective management of ecosystems while ensuring that those relying on ES for their livelihood have their needs met. This research was undertaken to contribute to understanding of PES approaches in the context of poor communities and protected areas. A mixed method research design with surveys, interviews, and focus groups was employed for data collection in communities around Gishwati-Mukura National Park, Rwanda, gazette in 2015. Results revealed that those with land adjacent to the park have negative perceptions about the new PA mainly due to the lack of communication between

local members and those involved in PA management, participation in decision making, and the uncertainty about direct benefits that the new PA will bring to these communities. Many interviewees have been negatively affected by the PA (either by not receiving any compensation for the damage caused by crop raiding or losing their lands for the extension of the boundaries of the PA.) Some reported the potential benefits of having a PA especially the expansion of the tourism industry which they believe will bring infrastructure, jobs, and increased cash flow into the communities. These motivations give hope to local communities and provide incentives for involvement in a PES scheme as a tool to improve socioeconomic wellbeing while at the same time achieving effectiveness in the management of this PA. This research highlights the need for understanding the various motivations of stakeholders and how to ensure their participation in designing and implementing the scheme. Seven factors were identified in this research as enabling factors for a successful implementation of a PES scheme in poor rural communities settled around Gishwati forest. Those factors are: 1) improvement in livelihoods (associated with income, crop production, land ownership and land use), 2) nature of incentives, 3) community advocacy, 4) social cohesion, 5) governance structure, 6) socio-economic development opportunities, and 7) stakeholder engagement. This research yielded practical and managerial insights important for a successful PES scheme, as well as theoretical contributions to understanding PES effectiveness for PA management and conflict reduction.

Keywords: ecosystem services, biodiversity conservation, environmental markets, attitudes and behavior change, socioeconomic wellbeing, fence and fine, community based-conservation, stakeholder participation in conservation.

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List of Abbreviations

ES	Ecosystem Services
FHA	Forest of Hope Association
GACP	Gishwati Area Conservation Program
GMNP	Gishwati-Mukura National Park
IMF	International Monetary Fund
IRB	Institutional Review Board
IUCN	International Union for Conservation of Nature
LAFREC	Landscape Approach to Forest Restoration and Conservation
MEA	Millennium Ecosystem Assessment
MINIRENA	Ministry of Natural Resources Rwanda
NGO	Non-Governmental Organization
PA	Protected Area
PAs	Protected Areas
PES	Payment for Ecosystem Services
REMA	Rwanda Environment Management Authority
Rwf	Rwandan Franc
UNEP	United Nations Environment Programme
USD	United States of America Dollar

Chapter 1: Introduction

Human societies have relied on resources from ecosystems to meet their livelihood needs for many centuries. The goods and services from ecosystems, known as Ecosystem Services (ES), are globally significantly decreasing due to high demand and low production rates (Kubiszewski, Costanza, Anderson, & Sutton, 2017; Saarikoski et al., 2018). Increased demand for ES is related to societies' changing economic demands and opportunities, such as food and commercial crop production (e.g., cocoa, rubber and palm oil plantations, soybean cultivation, timber extraction, urbanization, and infrastructure development such as roads, electrification, potable water) (Lambin et al., 2001). In some countries, population growth also contributes to increased exploitation and utilization of ES, leading to scarcity of natural resources (Liu, Feng, Zhao, Zhang, & Su, 2016; Mather & Needle, 2000). Population pressures on tropical ecosystems in developing countries are often associated with the search for economic opportunities and the weak enforcement of policies designed to guide the management of human settlements around protected ecosystems (Benra & Nahuelhual, 2019; Islam, Bing, & Hossen, 2019; Burns, Krott, Sayadyan, & Giessen, 2017; Delaquis, de Haan, & Wyckhuys, 2018). These challenges often hinder the successful management of protected areas (PAs) which are the primary tool in biodiversity conservation strategies (Joppa, Loarie, & Pimm, 2009; Naughton-Treves, Holland, & Brandon, 2005).

In most developing countries, the "fence- and- fine" approach (often critiqued as prioritizing wilderness over people) has been guiding the management of PAs for many years but has frequently been ineffective in reducing anthropogenic activities that negatively affect biodiversity conservation (Barrett, 1995; Furze, De Lacy, & Birckhead, 1997; Michaelidou, Decker, & Lassoie, 2002). This approach, in which human presence is seen as incompatible with biodiversity

conservation, has often failed to achieve effective PA management, and has been criticized as failing biodiversity conservation (Brandon, Gorenflo, Rodrigues, & Waller, 2005; Inogwabini, 2020). Arguments have been made in favor of a "participatory" approach in which concerns about the livelihoods of local communities and respectful interpersonal relationships are balanced with the management of PAs (Kremen, Raymond, & Lance, 1998; Schwartzman, Moreira, & Nepstad, 2000; Stern, 2008; Sunderland, Ehringhaus, & Campbell, 2007; Viteri & Chávez, 2007). A participatory approach to conservation requires an understanding of the link between ES and the socioeconomic wellbeing of local communities (Dawson, Martin, & Danielsen, 2018; García-Llorente et al., 2018; Serenari, Peterson, Wallace, & Stowhas, 2017).

The connection between ES and the socioeconomic wellbeing of people is complex and is influenced by multiple factors, e.g. location, timeframe, access restriction to ES, social status of the beneficiaries, and the associated ecosystem management approaches (Daw et al., 2016). Regardless of these factors, ecosystems contribute to people's socioeconomic wellbeing and the preservation of ecosystems through PA management strategies has the potential to enhance the quality and quantity of ES. Various PA management strategies may prevent or restrain local and fringing communities from using ES that was accessible to community members prior to gazettement. Despite various PA management strategies that make PAs the backbone of natural resource conservation, for many years, some PAs have not been able to protect ecosystems adequately (Bowker, 2017; Johnson et al., 2017; Palacín, 2018). Recent studies show that the world has entered "the sixth extinction" phase and with very high rates of species extinctions (Barnosky et al., 2011; Cao, 2018; Ceballos et al., 2015; Eldredge, 2001). This rapid disappearance of biodiversity is partially exacerbated by increased demand for resources due to increasing

populations, habitat fragmentation, toxic pollutant release, overharvesting, and increased industrial activities that have caused destruction of natural resources (Barnosky et al., 2011; Eldredge, 2001; Kolbert, 2014; Maclean & Wilson, 2011). The high extinction rates and rapid land cover changes demand effective and efficient natural resource conservation strategies to protect ecosystems, while ensuring that those relying on ES for their livelihood have their needs met.

To respond to this need, many approaches to conservation such as community-based natural resource management and integrated conservation and development projects have been created to conserve ecosystems. However, due to the high financial needs, short length of external funding availability, the corruption often associated with the implementation of these approaches in developing countries, as well as lack of community participation, they have often failed to deliver (Balmford, 2001; McShane, 2004; Sandker et al., 2009; Sayer & Wells, 2004; Shepherd, 2004; Smith, 2003), which led to the concept of ES being used as guidance in the development of market-based environmental management schemes, also called Payments for Ecosystem Services (PES) (McShane, 2004; Sandker et al., 2009). This is a conservation strategy where land users, who are often poor with small lands, receive incentives from ES buyers to motivate them to continue to protect ES on their lands and on public lands such as PAs (Landell-Mills, Bishop, & Pagiola, 2002). The theory behind a PES approach is that those who provide ES should be compensated for doing so and that those who benefit from the services should pay for their provision (Landell-Mills et al., 2002). A PES approach aims at protecting ES by compensating landowners or managers who adopt practices that are favorable to an ecosystem with the landowners paid by those who use the ecosystem services (Pagiola et al., 2007). PES can be made by direct private payment, which consists of transactions between private service providers and users, or by direct public and

government payments, where the government pays service providers on behalf of their constituents. PES also is based on a conditional transaction, where payments are made directly to the seller and only when the seller has honored the terms and conditions in the contract between the two parties (Wunder, 2007). PES schemes are also being considered as instruments to reduce poverty and possibly to achieve the sustainable use of natural resources, especially resources from protected ecosystems (FAO, 2007; Pattanayak, Wunder, & Ferraro, 2010; Turpie, 2008; Zilberman, Lipper, & McCarthy, 2008).

Focusing on protected ecosystems, some authors argue that environmental markets such as PES systems have focused only on environmental concerns (e.g., carbon sequestration, watershed protection, biodiversity conservation, and landscape beauty) and not necessarily on economic development (Grieg-Gran, 2005; Landell-Mills et al., 2002; Pagiola, Arcenas, & Platais, 2005). These authors claim that PES and other environmental markets should support the protection of forested ecosystems by building capacities of communities through 1) including local communities in discussions and activities related to ecosystem protection; 2) encouraging local communities to take part in training programs related to biodiversity conservation; and 3) recognizing these communities as direct users and beneficiaries of ES. These considerations are explored in more detail in chapter four of this dissertation.

To date, many ecosystem-related studies have focused on the importance of ES to human wellbeing and the role of PES in achieving biodiversity conservation on a broader scale (Ezzine-de-Blas, Wunder, Ruiz-Pérez, & Moreno-Sanchez, 2016; Neeff, 2009). Countries such as Costa Rica, China, and Mexico have well established PES schemes that reinforced biodiversity conservation and poverty alleviation, and studies that evaluated those schemes revealed that

participating communities improved their quality of life (MEA, 2005; Ash et al., 2010; Pagiola et al., 2005). However, as shown by some studies, in order to be effective, PES schemes should be designed and implemented at the community or micro level to better manage various variables, such as governance structure, legal concerns, property rights, equity, and transaction costs (Gross-Camp, Martin, McGuire, Kebede, & Munyarukaza, 2012; Pagiola et al., 2005). In addition to these factors, costs associated with initiating PES schemes are influenced by the ability of a country or a community to afford those costs, and the affordability has been one of the drawbacks in initiating PES schemes. While PES schemes are not new in developing countries, currently, there is the need for more research to explore the potential of PES at a micro level (e.g., community level) in developing countries (Hejnowicz, Raffaelli, Rudd, & White, 2014; Wunder, Engel, & Pagiola, 2008). This comes mainly from the fact that many communities in developing countries rely heavily on natural resources while facing challenges from poverty, unclear or non-existent land rights, equity and fairness in decision-making, as well as strict rules preventing them from using ES from PAs.

The goal for this dissertation research was not only to understand the role PES can play in PA management and socioeconomic development, but also to explore how a PES approach can be used in the management of PAs in Rwanda where communities rely heavily on natural resources. The Rwandan Government has an interest in using the PES approach to reconcile conflicts between biodiversity conservation and livelihood (Bagstad et al., 2020). This dissertation focused on understanding how members from the communities located within five kilometers of Gishwati-Mukura National Park have used this park before and after it became a protected area and their perceptions about the forest being designated as a PA. A mixed methods approach to research was

used for data collection and data were obtained from interviews, surveys and focus groups conducted in four communities (Gihira, Mubuga, Nyagahinika, and Rundoyi cells), each settled within five kilometers from the edge of the park.

This research investigated various enabling factors (such as livelihoods, land-use change, household and community education, income level, governance structure, socio-economic development opportunities, and stakeholders' motivations to engage in a PES scheme) that potentially could contribute to successful implementation of a PES scheme in rural poor communities settled around forested PAs in a developing country. The research focused on the following questions:

1. To what extent do rural communities living adjacent to Gishwati-Mukura National Park rely on resources from this park?
2. What are enabling factors that support (or assist) PES to promote both tropical forest conservation and socioeconomic wellbeing of communities located around the forest in developing countries?
3. What factors make community stakeholders willing to engage in a PES scheme?

Four chapters follow this introductory chapter. Chapter 2 presents a conceptual framework and general literature review on the complex linkages between ecosystem services and human wellbeing and how people engage in biodiversity conservation in response to two protected area management approaches, one known as a "fence and fine" approach and the other known as a participatory approach. Chapter 3 explores the socioeconomic wellbeing and perceptions of four communities located around Gishwati-Mukura National Park, and how the socioeconomic wellbeing of these communities influence their use of forest resources. Chapter 4 explores enabling

factors that could support a PES scheme, and provides an assessment on the potential of using payment for ecosystem services as a tool to enhance the socioeconomic wellbeing of communities around Gishwati-Mukura National Park in Rwanda. In this chapter, I also investigated willingness of communities' stakeholders' to engage in a PES scheme. Chapter 5 summarizes findings and key points from my research and provides recommendations and suggestions for future research as well as potential policy guidelines for environmental leaders to engage in environmental schemes that could engage local members in activities that benefit PAs.

Ethical consideration

The Institutional Review Board (IRB) guidelines and those from the Rwanda Development Board (RDB) were followed during this research. An effort was made to follow these guidelines and use professional ethic to minimize harms and risks and maximize benefits; respect human dignity, privacy, and autonomy; take special precautions with vulnerable populations; and strive to distribute the benefits and burdens of research fairly (Shamoo & Resnik, 2015). All those who were involved in this research were aware that participation in any aspect of the research process was voluntary, and participants had the right to withdraw at any time. Each participant signed a consent form that disclosed how the gathered information was going to be used (anonymous or open to public).

Some of the information collected was sensitive in nature and could have affected the relationships between participants and park managers. With that in mind, every possible effort was made to protect confidential communications or information, such as which households had illegally collected resources from the forest. In this dissertation and any other reports, publications and conversations, identities were fully concealed. In terms of publishing the information from

this research, the information is shared with the primary objective to advance research and scholarship and provide guidance to those who may want to use this research to improve the management of forested ecosystems while improving the socioeconomic wellbeing of households.

Limitations of the study design

It is important to highlight that this research focused on only communities located within 5km of the forest. Even though it has been mentioned that 5km is a distance adequate enough to study the socioeconomic effects of the forest to the communities (Hartter, 2009), it is understood that communities farther from the forest may have effects on this national park as well. Other limiting factors that were considered are cultural aspects that marginalize the representation of women in the countryside as representatives of the households in the presence of their husbands. To remediate this, 50% men and 50% women were purposely involved in the research. As the government of Rwanda has been at the forefront of gender balance and as women's participation in various sectors of governance, business, and education has in recent years been encouraged and recognized to be a positive change in Rwanda, there was no resistance from the communities in terms of equally engaging both men and women in this research.

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Chapter 2: Understanding the role of socioeconomic wellbeing of communities in protected area management

Abstract

Conflicts between protected areas and people living around those ecosystems remain a persistent constraint to effective biodiversity conservation and to socioeconomic wellbeing of people living around the protected areas. Poverty and human population increase around protected areas have been identified among the contributing factors to conflicts between protected area management and the socioeconomic wellbeing of those living in the proximities of protected areas. To date, many ecosystem services-related studies have focused on the importance of ecosystem services to human beings. However, limited studies have explored the role of socioeconomic status of communities in influencing and affecting the ways protected ecosystems are viewed, used and conserved by local communities. Attention to social complexity through studies about human connections with nature could provide insights needed for effective management of protected ecosystems. To explore this possibility, I reviewed the literature review on 1) the complex linkages between ecosystem services and human wellbeing and 2) how people engage in biodiversity conservation in response to two protected area management approaches, known as "fence and fine" approach and participatory approach. Based on this literature review, a hybrid approach to conservation that could encompass both these approaches is suggested as a potential tool to manage conflicts between protected areas and local communities.

Keywords: Protected ecosystems, biodiversity conservation, socioeconomic wellbeing, "fence and fine," participatory approach, conservation psychology, human connections with nature.

Introduction

Ecosystems provide many raw tangible services (e.g., plants, animals, water and minerals) that are transformed into economic products and intangible services (e.g., cultural heritage, recreational values, and aesthetics) that are beneficial to meet people's social and cultural needs (Andersson, Garine-Wichatitsky, Cumming, Dzingirai, & Giller, 2017; Brandon, 2005). Ecosystem functions influence the nature, quality and quantity of ES that are socio-culturally important to humans. Ecosystem services are grouped under provisioning, regulating, cultural and supporting services. Protected ecosystems are the backbone of biodiversity conservation, and understanding the concept of ES with regard to the management of protected areas (PAs) and the socioeconomic status of people is then an essential tool in the management of protected ecosystems (Schwartzman, Moreira, & Nepstad, 2000; Stern, 2008; Sunderland, Ehringhaus, & Campbell, 2007; Viteri & Chávez, 2007).

Analyses of the effectiveness of biodiversity conservation through PAs continues to be an important topic for local and global conservation discussions among scholars and policymakers (Bax & Francesconi, 2019; Ghosh-Harihar et al., 2019; Zhang, Luo, Mallon, Li, & Jiang, 2017). Challenges to effective management continue, causing the loss of biodiversity and creating negative perceptions about ecosystems protection among local people (Bennett & Dearden, 2014). Some authors argue that negative perceptions about biodiversity conservation are influenced by: 1) limitations in allowable economic activities such as agricultural development and commercial exploitation of natural resources (Githiru & Njambuya, 2019; Hummel et al., 2019; Visconti et al., 2019) and 2) investments in PA management by developing countries at the cost of local economic

development that otherwise could support local economy and, hence, improve the socioeconomic status of local communities (Chen, 2020; Sloan et al., 2019; Yakusheva, 2019). However, without jeopardizing the integrity of biodiversity, PAs have the potential to generate economic benefits through ES, tourism revenue-sharing, local infrastructure improvements that support the local economy, and improved socioeconomic status of local households (Agyeman, Yeboah, & Ashie, 2019; Munanura, Backman, Hallo, & Powell, 2016; Serenari, Peterson, Wallace, & Stowhas, 2017).

The level of socioeconomic status of households influences the ways people from local communities view, use and could engage in activities that benefit PA management (Bulte, Lipper, Stringer, & Zilberman, 2008; Liu, Feng, Zhao, Zhang, & Su, 2016). Poor communities rely on ES for basic needs. Therefore, PA management that prevents access to those services also negatively impacts the wellbeing of poor communities. Poverty as one of the indicators of socioeconomic status has been among the key driving factors of conflicts between biodiversity conservation in PAs and the need to meet the basic needs of life, especially in developing countries (Bulte et al., 2008; Duffy, John, Büscher, & Brockington, 2016; Grieg-Gran, 2005). In search of resources such as land for agriculture, firewood, wild fruits, meat, charcoal and timber for construction to meet basic livelihood needs, local communities may negatively affect PAs and, in the search for those services from PAs, conflicts emerge (Adams et al., 2004; Agyeman et al., 2019). When access to resources is limited, conflicts become more complex. This complexity calls for more in-depth knowledge of how local community needs affect PA management and how the socioeconomic status of local communities could be improved without jeopardizing the integrity of PAs (Ghulam & Tsuchiya, 2017; Pelletier, Gélinas, & Potvin, 2019; Sene-Harper, Matarrita-Cascante, & Larson,

2019).

As an example, the government of Rwanda recognizes the importance of investing in the private sector to increase the cover of public-owned forests from 14.1% (2017) to 80% by 2024, with the expectation that members of local communities will work together in meeting their livelihoods without heavily relying on resources from PAs (The Republic of Rwanda, 2019). To achieve this, the government of Rwanda launched tree-planting initiatives to alleviate the pressure on PAs from the high demand for wood for the wood industry, agroforestry, and firewood usage. Along with alternative fuels such as cooking gas and biogas, these initiatives will reduce the number of households relying on firewood as a source of energy for cooking from 79.9% (2016/17) to 42% by 2024 (The Republic of Rwanda, 2019). As some of the community members access PAs illegally to collect firewood, this effort could potentially reduce the amount of firewood harvested from PAs by local communities, hence less conflicts arising from being restricted from using resources from PAs.

The more that communities are restricted from accessing resources from PAs, the more conflicts arise and the less likely communities are willing to participate in activities that benefit PAs (Bennett & Dearden, 2014; Woodroffe, Thirgood, & Rabinowitz, 2008; Zorondo-Rodríguez, Díaz, Simonetti-Grez, & Simonetti, 2019). Some level of benefits from PAs by local communities has the opportunity to foster positive perceptions towards PA management and could improve the wellbeing of communities (Heagney, Kovac, Fountain, & Conner, 2015; MacKenzie et al., 2017; Schaafsma et al., 2014). This review focuses on the role of understanding the complex linkages between the socioeconomic wellbeing of local communities and communities' responses to two PA management approaches known as "fence and fine" and "participatory." The review highlights

the role of understanding human connections with nature in promoting behaviors that can bridge the gap between meeting socioeconomic wellbeing and conserving biodiversity through effective PA management. Studies that focus on environmental identity and behavior change are used in this review to explore the reciprocal relationships between people and PAs and to inform how people can be encouraged to engage in biodiversity conservation. Environmental identity is defined as "the sense of connection with the non-human environment, based on history, emotional attachment, and/or similarity that affects the way people perceive and act toward the world, and the belief that the environment is important and forms a subsequent part in self" (Clayton & Opotow, 2003, p. 45). From understanding such reciprocal relationships, this review provides then a brief overview of the role of a hybrid approach to PA management that could embrace both "fence and fine" and "participatory" approaches to PA management.

Local communities and PA management

Socioeconomic wellbeing and the use of natural resources

The definition of socioeconomic wellbeing used in this chapter is based on the understanding that "wellbeing arises from what people have, what they can do and how they think and feel about what they both have and can do" (McGregor, McKay, & Velazco, 2007, p.110). Based on this understanding, community wellbeing is characterized by a mix of conditions such as social, economic, environmental, cultural and political attributes that allow individuals, households, families and groups of people or communities to have all or most of what they need in order to meet their livelihood demands. Most definitions of community wellbeing agree that it is a state characterized by access to necessities of life including, but not limited to, secure and

adequate livelihood, shelter, clothing, education, healthy living, good environment (clean air, clean water) and good social relations that include social cohesion, mutual respect, and the ability to achieve a sustainable living (Blewitt, 2017). This notion of wellbeing rests heavily not only on community access to economic resources or ownership of material possessions, but also on what the community stands for and can do, as well as what the community aspires to do and to be (Appadurai, 2004; Swift, 2006). This partially justifies the role of community participation in decision-making that will be explored in this paper.

The economic and social wellbeing of communities are interconnected, and most of these connections are easily quantifiable, such as income, poverty level, education, employment and engagement in decision-making process (Clark & Oswald, 1996; Diener, 1994; Granovetter, 2005; Narayan, 2002; Woolcock, 2001). These quantifiable connections also are relevant in informing policy- and decision-makers about the needs of communities and could shed light on approaches needed to achieve effectiveness in PA management. The inclusion of local people from all social classes and genders in the decision-making process contributes to understanding the needs of communities and increases the likelihood of compliance with PA policies (Alkon & Traugot, 2008; Dawson, Martin, & Danielsen, 2018; Kee, Lee, & Phillips, 2016). As further explored in this paper, some studies suggest that greater integration of local communities in decision-making is one of the critical strategies for ensuring the effectiveness of a PA management participatory approach (Andrade & Rhodes, 2012; Li, 2006; Vermeulen & Sheil, 2007).

While various studies advocate for the role of engaging both men and women in decision-making and in PA management, the role of women in achieving effectiveness in PA management has not been given much focus. Women's participation in PA management has often been limited

to educating others about the importance of PAs in general and to projects that require labor contribution (Allendorf & Allendorf, 2013; Sundström, Linell, Ntuli, Sjöstedt, & Gore, 2020). The need to address the gender disparity in PA policy making and actions is important for biodiversity conservation and for PA management in particular (Caballero-Serrano, 2017; Iftekhar & Takama, 2008). Some studies have found that depending on culture, men are likely to make their voice heard than women, and women are less likely to have a positive attitude toward PAs because they are less likely to express perceptions of problems and benefits associated with PA management (Agrawal & Gibson, 1999; Costa, Casanova, & Lee, 2017; Groves, 2005). Men have also been identified to benefit more from PAs than women, influencing positive perceptions and positive attitudes towards PAs (Stringer, Thomas, & Twyman, 2007; Sundström et al., 2020). Some studies have also shown that cultural beliefs and traditions restrict women's access to resources such as land, making them to have no say in the decision-making process over land management and if any, women are underrepresented in local decision-making committees (Adedayo, Oyun, & Kadeba, 2010; Gausset, Yago-Ouattara, & Belem, 2005; Shackleton, Paumgarten, Kassa, Husselman, & Zida, 2011). In other cases, women experience challenges securing financial supports which inhibit their ability to cope with poverty.

Socioeconomic status of communities and PA management approaches

The creation of PAs evolved with the aim of creating environmentally unique areas in order to protect biodiversity, while allowing controlled public access to visit and enjoy these areas. The world's first national park was the Yellowstone National Park, established in 1872 (Mitchell, 2007). The idea of original PAs, like Yellowstone, was to draw boundaries around environmentally unique areas in order to protect them from damaging uses and to allow the public to visit and enjoy

them (Wells & Brandon, 1993). Since then, PAs have been vital in protecting biodiversity; and used various approaches to PA management such as the "fence and fine" and "participatory" approaches.

While these approaches to PA management exist, they have been implemented with mixed biodiversity conservation outcomes (Pyhälä, Frascaroli, & Sajeva, 2018; Redmore, Stronza, Songhurst, & McCulloch, 2018). This is mainly because marginalized or poor local community members are usually not involved in PA management, and their needs and aspirations are in some cases ignored, which can demotivate communities to engage in biodiversity conservation initiatives around PAs (Andrade & Rhodes, 2012; Mascia, 2003; Reed, 2008). Coupling this lack of motivation to engage in conservation activities with the lack of enough resources to meet their livelihood needs, marginalized communities living in proximity of PAs become a hindrance to achieving effectiveness in the management of PAs (Andrade & Rhodes, 2012). The settlement of communities has increased around PAs increasing the demand for goods and services to meet their socio-economic wellbeing (Bailey, McCleery, Binford, & Zweig, 2016; Huang et al., 2020; Mtui, Owen-Smith, & Lepczyk, 2017; Wittemyer, Elsen, Bean, Burton, & Brashares, 2008).

The lack of well-designed policies that guide the management of protected ecosystems and provide clear land tenure policies aimed at controlling the settlement of communities around protected areas are major problems facing many countries. Apart from the lack of clear policies, enhancing the knowledge of local community members for better understanding of both direct and indirect benefits associated with PAs has not been given much attention (Gani, Mahdzar, & Razak, 2020; Vodouhê, Coulibaly, Adégbidi, & Sinsin, 2010). Authorities managing PAs need to work closely with local communities to institute policies and regulations that will allow communities to

change their behaviors and perceptions towards PAs (Wunder, 2005). Enhancing collaboration with local communities in PA management is often associated with promoting the wellbeing of communities.

Management approaches used to protect biodiversity in PAs could have either positive or negative impacts to the socioeconomic status of communities (Joshi, 2016). Some of the ways to gauge how PA management approaches affect the socioeconomic wellbeing of local communities include median household income, poverty rates, employment, formal and informal educational attainment levels, population fluctuation rates, participation in local government and infrastructures available in a household or in the community (Parkins, Stedman, Patriquin, & Burns, 2006; Patriquin & Halpenny, 2017). To date, not many studies have explored the role of socioeconomic status of communities located near protected ecosystems in guiding PA management approaches (Garnett, Sayer, & Du Toit, 2007; Heagney, Kovac, Fountain, & Conner, 2015).

The "fence and fine" approach reconsidered through human connection with nature

The "fence and fine" approach to PA management, also labeled as a "protectionist model," "fortress conservation," or "coercive conservation" was predominant in developing countries in the 20th century and guided the establishment of PAs in the form of national parks, game reserves and forest reserves (Guthiga, 2008; Tesfaye, 2017). This approach reinforces the exclusion of local people from the PAs and prevented any consumptive use that supported the livelihoods of local communities and all people in general. The core of this approach is that development activities intended to support local communities will hinder biodiversity conservation (Guthiga, 2008). While the "fence and fine" management approach was reinforced by governments and

international organizations and has contributed to reducing or slowing biodiversity loss, studies continue to report the loss of biodiversity in PAs associated with the demand for essential needs from local communities (Lambin et al., 2001; Ordway, Lambin, & Asner, 2017; Semper-Pascual et al., 2019). As this approach keeps people out of PAs, it creates separation of local communities from nature that plays an integral part in their lives, causing less engagement of these communities in the management of PAs (Brandon, 2005).

Some studies have demonstrated that an integral part of the life of humans is rooted in their socio-cultural practices and their belief systems, which contributes to their environmental identity and their behavior towards PAs and specific ecosystems in general (Clayton, 2012; Ladio & Lozada, 2009). As argued by Stedman (2002), Uzzell, Pol, & Badenas (2002), and Vorkinn & Riese (2001), socio-cultural practices contribute to bond-creation between members of the communities, increasing the sense of environmental identity, hence environmentally sustainable attitudes and behaviors that could benefit PA management. According to Stedman, (2002), place attachment or local identity positively affect the willingness of individuals or community to protect an ecosystem. Vorkinn and Riese (2001) affirmed that environmental identity could predict negative attitudes toward a project that could affect the place that people are attached to, and this is the case of a major hydropower development in a rural area in Norway that caused negative environmental impacts among residents. Such assumptions about the role of socio-cultural practices that shape environmental identity creating positive or negative behaviors might also apply to in the context of PAs.

In recent years, the socio-cultural assessment of ES has become an essential tool for understanding people's attitudes towards PAs and their reliance on goods and services provided

by various protected ecosystems (Engen, Fauchald, & Hausner, 2019). As explained by the conservation psychology, human beings are part of nature, and restricting their interactions with nature has consequences that range from stressful and unhealthy lives to rebellion against rules and regulations that separate them from nature (Clayton & Myers, 2015). While the "fence and fine" management approach has attempted to make PAs a refuge for species and natural ecosystem processes threatened by anthropogenic factors, restricting people from using PAs creates problems that challenge biodiversity conservation.

Duraiappah (1998) and Namara et al. (2010) advocate that the main target for biodiversity conservation should be to address the root cause of environmental destruction by improving the socioeconomic status of people, which will lead to successful biodiversity conservation. Secondly, Colchester (2004) and Pelletier et al. (2019) argue that there is a need to address unfairness caused by taking away property and rights of communities around PAs without offering reasonable compensation. Finally, Brockington (2007), Robbins et al. (2006), and Schuett et al. (2016) argue that not enough revenue generated from PAs through tourism industry is allocated to communities around PAs, and this makes members of local communities realize no benefit to losing their property and rights to biodiversity.

While not many studies are available to provide a comprehensive cost of local community losses associated with PAs, as Duraiappah (1998) and Namara et al. (2010) have pointed out, less attention is given to factors such as the socioeconomic, cultural, educational and spiritual wellbeing of local communities that influence their perceptions about PAs. Taking these factors into consideration while responding to local communities' losses caused by the "fence and fine" approach to PA management is worth exploring and could inform what adjustments are needed to

make the "fence and fine" approach effective while meeting those local needs. As an example, buffer zones around PAs accommodate the use of resources in a controlled manner while not jeopardizing the effectiveness of PAs (Budhathoki, 2004). Buffer areas allow local communities to continue to benefit from ES, which could provide an opportunity to forge partnership agreements between local community and PA authorities. However, in some cases, buffer zones around PAs were designed not to allow local communities to meet their livelihoods but to reduce their opposition about PA management (Songorwa, 1999; Wells & Brandon, 1993). Although biodiversity conservation is given first priority in buffer zone management (Brandon, 1997), the need to meet the socioeconomic wellbeing of local communities is an important factor to give priority in order to achieve successful management of buffer zones, hence the importance of community participation in PA management.

The transition to participatory approaches

The potential role of communities' perceptions in PA management was among the key motivations to explore the role of a participatory approach in PA management (Adams & Hutton, 2007; Budhathoki, 2004; Cunningham, 2014; Hutton, Adams, & Murombedzi, 2005). Unlike the "protectionist" approach to conservation, where communities are considered a "threat" to biodiversity conservation and a hindrance to achieving effectiveness in PAs, the participatory approach to PA management engages local communities as key stakeholders in the management of PAs and other activities that may benefit biodiversity conservation (Adams & Hulme, 2001). This approach acknowledges local livelihood needs and the objectives of PA management as key factors to achieve effective biodiversity conservation through voluntary compliance of regulations by local communities (Schwartzman et al., 2000; Stern, 2008; Sunderland et al., 2007; Viteri &

Chávez, 2007).

Cernea and Schmidt-Soltau (2006) assume that local communities will abide by PA management rules when their socioeconomic wellbeing are assured. Such an assumption partially justifies the invention of environmental markets such as Integrated Conservation and Development Projects (ICDPs) that aim at meeting the needs of communities around PAs (McShane & Wells, 2004; Wells, Guggenheim, Khan, Wardojo, & Jepson, 1999). However, some scholars such as Viteri and Chávez (2007) have demonstrated with empirical evidence that local communities are likely to comply voluntarily with PA regulations if they have trust in the PA management and may not require incentives. This requires the management of PAs to change their perceptions, attitudes and behaviors to develop a sense of mutual trust with local people and to embrace the culture of engaging members from local communities in decision-making and implementing projects geared toward biodiversity conservation (Kubo & Supriyanto, 2010; O'Riordan, 2002; Vermeulen & Sheil, 2007).

The mobilization and active participation from stakeholders involved from local communities is essential to mitigate the impact of PAs to local communities and, thereby, reduce the adverse impacts of local communities on the PAs (Adams & Hutton, 2007; Budhathoki, 2004; Cunningham, 2014; Hutton et al., 2005). Where such practice is in place, the involvement of local communities in conservation and in the distribution of benefits from PAs improves the relationships between PA authorities and local communities, which reduces conflicts between PA management and local communities (Kothari, 2001). While some studies argue that the support from local communities has little influence on the effective management of PAs (Bruner, Gustavo, Gullison, & Rice, 2001; Young et al., 2013), the collaboration with local communities is vital for

a successful PA management plan (Büscher & Whande, 2007; Tessema, Lilieholm, Ashenafi, & Leader-Williams, 2010). Working closely with local communities creates positive perceptions about PAs and such perceptions are important in engaging local people in activities that benefit PAs and biodiversity conservation in general. This is the case 1) of marine protected areas in peninsular Malaysia where environmental knowledge, perceived social-cultural and economic impacts influenced community participation in PA activities (Masud, Aldakhil, Nassani, & Azam, 2017), 2) of the Mole National Park in Ghana where positive perceptions fostered by receiving benefits from the PA increased community engagement and improved collaboration between local communities and the management of the PA (Abukari & Mwalyosi, 2020), 3) of the Paraty region of Brazil where community participation in the review of the PA management plan enhanced collaboration (Bockstael, 2016), and 4) of some private protected areas in Chile's Los Ríos region where educational campaigns encouraging environmental stewardship and ecotourism entrepreneurship motivated local communities to participate in various activities that benefitted the PA (Serenari et al., 2017).

While participation of local communities in PA activities could benefit PAs when done correctly, participation is also to be considered as a fundamental right that brings people to collective action, with an opportunity for PA management personnel and local and country leaders to contribute to empowerment of communities and to assist these communities to build their capacity. A well-planned and implemented community participation in PA management has the potential to benefit local communities with resources and skills that could enhance their socioeconomic wellbeing. Pretty (1995) explains that participation ranges from "manipulative participation," where participants have no power or say in the decision-making, to "self-

mobilization" participation, where participants are in charge of objectives and targets. Arnstein (1969) developed a progression of participation that explains various stages of participation, ranging from the best scenario of the "citizen control" to the worst scenario of "non-participation", where therapy and manipulation are classified.

Besides engaging local communities in PA management, other factors influence attitudes and perceptions that could promote PA management. These factors are: 1) the benefits received from the PAs, 2) the familiarity with PA management, 3) the level of collaboration with the staff managing PAs, and 4) understanding the goals and objectives of the PAs (Ormsby & Kaplin, 2005; Ramakrishnan, 2007). These factors influence perceptions of local communities towards PAs and have been shown to influence the kinds of interactions people have with PAs and, thereby, how they abide the rule and regulations protecting biodiversity. Thus, it is important to understand peoples' perceptions and interactions with PAs.

Conservation psychology explores the potential role of the community's sense of place or environmental identity to foster behavior change that has the potential to increase the likelihood of communities' participation in biodiversity conservation (Clayton & Myers, 2015). The concept of sense of place, which encompasses all dimensions of human perceptions, connections and interpretations of the environment, has been indicated as a potential concept in bridging gaps between environmental management and human wellbeing (Hausmann, Slotow, Burns, & Di Minin, 2016; Russell et al., 2013; Williams & Stewart, 1998). Peoples' environmental identity and attachment to an ecosystem have the potential to trigger positive perceptions and environmental behaviors that could bridge the gap between people's needs and PA management (Agbola, Hicks, & De Freitas, 2013; Eisenhauer, Krannich, & Blahna, 2000). By taking into consideration peoples'

relationships with place, decision-makers and PA managers, in particular, can be better equipped to develop management strategies that will foster local communities' positive perceptions about PAs and their environment (Williams & Stewart, 1998). This is the case of the Tuscan Archipelago National Park and the Gennargentu National Park in Italy where the strong place-attachment of the communities increased cooperative behaviors between local people and PA management personnel (Bonaiuto, Carrus, Martorella, & Bonnes, 2002).

An integral part of the life of humans is rooted in their socio-cultural norms, moral obligations and their belief systems, which explains their environmental identity and their behavior towards nature and specific ecosystems in general (Clayton, 2012; Ladio & Lozada, 2009). Authors such as Williams and Stewart (1998) and Horwitz et al. (2001) indicated that an ecosystem and its biodiversity could influence norms and moral obligations that provoke the sense of place and stimulate emotional responses that can benefit biodiversity conservation (Agbola et al., 2013; Tesfaye, 2017). Sense of place has been positively identified to increase peoples' willingness to conserve the place to which they are attached (Hausmann et al., 2016; Williams & Stewart, 1998), and this comes from gaining healthy benefits, such as relief of stress, increase of positive mood, and the reduction of mental fatigue (Li, Zhai, Xiao, Newman, & Wang, 2019; Cecily Maller, Mumaw, & Cooke, 2019); sense of social integration (Kweon, Sullivan, & Wiley, 1998); and the integrity of a personal or community identity (Horwitz et al., 2001; Maller, Townsend, Pryor, Aguilera, & St Leger, 2006). Sense of place also has helped in understanding economic benefits such as the increase of work productivity (Hausmann et al., 2016), the reduction in medical expenses by preventing mental illness (Dewa, Lesage, Aguilera, & Craveen, 2004), the enhancement of social collaborations (Alkon & Traugot, 2008; Thompson & Prokopy, 2016), and

tourism (Black & Cobbinah, 2018). Such benefits strengthen individual or community commitment to environment, which creates pro-conservation behaviors (Eisenhauer et al., 2000; Pretty, Toulmin, & Williams, 2011).

The concept of sense of place could be a useful tool to promote participatory behaviors important for PA management and provide an opportunity for decision-makers to use a community's attachment to nature to engage local people in PA management and to reduce conflicts between PA management and local community members (Sene-Harper et al., 2019; Thompson & Prokopy, 2016). While such could be the case, in some scenarios, peoples' attachment to nature may be in disagreement with biodiversity conservation objectives such as hunting to reduce the frequency and intensity of crop-raiding, horticulture practices for aesthetic pleasure, and alteration of the ecosystem to meet tourism needs (Buijs, Elands, & Langers, 2009; Kerley, Geach, & Vial, 2003; Reichard & White, 2001).

While connection with nature has the potential to influence behaviors towards the use of natural resources, some studies show the need to understand peoples' behaviors and attitudes to adapt to environmental changes (e.g., changes related to ecosystem function, weather and restrictions in the use of natural resources) that affect human health and wellbeing (Devine-Wright, 2013). Attention to these changes should be given, as they affect benefits from PAs received by local communities and could have a ripple effect on the level of participation in activities that benefit biodiversity conservation. This understanding is critical to identify what management actions are needed to adapt to changes and to ensure that basic livelihood needs of local people are met before holding them accountable for their behaviors toward biodiversity conservation (Pimbert & Pretty, 1997; Reddy et al., 2017). Moreover, such understanding has the potential to inspire new

conceptual understandings that could contribute to achieving the resilience of both human and ecosystem functions (Devine-Wright, 2013).

Integrating the concept of sense of place into PA management may foster human behaviors needed to achieve effectiveness in PA management. However, the theory of behavioral change is complex and requires not just a focus on general behaviors towards conservation but a comprehensive exploration of attitude change in the context of factors such as norms and moral obligations that impact conservation objectives (Reddy et al., 2017). Society influences values, beliefs, habits, and the way of living in general to meet the social norms and fulfill moral obligations towards self and the society (Farrow, Grolleau, & Ibanez, 2017). What other people do and think contribute to how an individual would think and act, and such connection is an important factor to consider when dealing with individual behavior change (Nyborg et al., 2016). Changing a behavior requires then a consideration of both society norms and moral obligation that influence any given behavior. In some cases, and especially in developing countries, human behaviors towards ecosystems have been associated with the need to meet livelihood demands, and changing such behaviors requires poverty alleviation to support the wellbeing of local communities (Bateman et al., 2013).

Conclusion

Conflicts between PA management and local communities are influenced by the socioeconomic wellbeing of communities located in the proximities of PAs. While many conflicts are driven by the need to meet the basic needs of life, understanding the social, economic and cultural needs of a community is an important step to remediate these conflicts (Oliva, García-Frapolli, Porter-Bolland, & Montiel, 2019; Woodroffe et al., 2008). Approaches to PA

management influence the socioeconomic wellbeing of people and affect how communities participate in activities that benefit PAs. With the "fence-and-fine" approach to PA management, local communities may be reluctant to engage in projects and initiatives that benefit a PA. Its use is among the reasons many conflicts exist between the management of PAs and local residents. The need to sustain livelihoods calls for poverty alleviation by allowing local communities to access resources from buffer zones or to support communities with resources from outside PAs.

Receiving benefits from PAs has the potential to foster positive perceptions by communities about PAs and likely could increase local community participation in PA management. Effective participation in PA management requires in-depth understanding of relationships between local communities and PAs. Various studies that focus on human interactions with nature explain the importance of understanding factors that influence behaviors and attitudes towards PAs (Vodouhê et al., 2010). Among these factors worth exploring when dealing with local community participation in PA management, is that the sense of place and environmental identity are important in shaping positive perceptions needed to increase the quality and level of participation of communities in achieving PA effectiveness.

While "fence and fine" and participatory approaches to PA management have their merits, a hybrid approach to PA management that could encompass both the restriction of resource use and the participatory approaches may contribute in reducing various local conflicts with PA management. Some attempts to implement such a hybrid approach have failed due to the lack of community support. Exploring how human connections with nature, the socioeconomic wellbeing of people, and the need for poverty alleviation can inform the hybrid approach could help in achieving effectiveness in PA management and could contribute at the same time to improving the

socioeconomic wellbeing of those who rely on PAs for their survival. In order to implement successfully such hybrid approach to PA management, I propose the consideration of four elements including 1) benefits from PAs to local communities, 2) socioeconomic status of local communities, 3) implementation of a partial "fence and fine" PA management and an increase in community participation in the management of PAs, and 4) human connections with nature.

These elements could benefit from the participation of many players that may include local leaders, government agencies with related interest to the subject, members from local communities with representation of indigenous groups both men and women equally represented, local and international non-governmental organizations, private sectors involved in PA management if any, and representatives of other sectors interested. Active participation of these players is important, however, may vary depending on factors such as interest in the PA framework, expertise in the field, availability to participate, geographic location, and resources available to allocate to the planning and implementation of a hybrid management approach.

This approach could allow local community members to benefit from ES available in PA allowing them to meet the basic needs of life while at the same time being engaged in activities that benefit PA management. This could lead to a win-win scenario where local community members can sustain their livelihoods and PA managers benefit from less conflicts caused by those in need to use the forest for their survival.

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Chapter 3: A new protected area: losses, gains and local communities' perceptions

Abstract

Understanding the complex connections between ecosystem services (ES) and the socioeconomic wellbeing of people is an important component of designing, implementing and managing protected areas that affect human communities. While protected ecosystems contribute to people's wellbeing, some of the PA management strategies may prevent local and fringing communities from benefiting from ES. This study was carried out to explore the socioeconomic wellbeing and perceptions of four communities located around Gishwati-Mukura National Park, created in 2015 in the northern part of Rwanda. A mixed methods study approach was used for data collection. Data gathered from 120 households through interviews and questionnaires as well as information from four focus groups with about 15 participants in each focus group suggest that factors such as 1) the type and size of the land holdings, which directs what activities are done on the land, 2) ways households acquired land, 3) the level of formal education, 4) the level & source of income, 5) the gain or loss caused by the park, 6) the presence or absence of park guards, and 7) the level of local communities' involvement in decision-making of the management of PAs all influence communities' perceptions about PAs. Participants' negative perceptions about Gishwati becoming a PA were correlated with communities' perceived experience from losing their lands to benefit biodiversity conservation. Land scarcity, crop decrease, and non-availability of off farm-jobs call for innovative PA management that promotes land use change to integrate farming-technology solutions, home-grown forages, and non-farming income generation opportunities that could be potential solutions in reducing the dependence to forest resources.

Keywords: Protected areas, ecosystem services, socioeconomic wellbeing, Gishwati-Rwanda

Introduction

According to the World Conservation Union protected areas (PAs) are defined as "areas of land and/or sea devoted to legal protection of biodiversity and all other natural and cultural resources associated with it" (IUCN & UNEP, 1994, p.27). Being hosts to endemic and/or endangered species that cannot survive in intensely-managed ecosystems (Bruner, Gustavo, Gullison, & Rice, 2001; Kramer, Schaik, & Johnson, 1997) makes PAs a worldwide priority for conservation efforts (Castro et al., 2015) and an attraction for ecotourism (Lawton, 2001). Besides protecting biodiversity, PAs are important providers of both direct and indirect ecosystem services (ES) to communities located within their vicinities, as well as to distant communities and the world at large. As of August 2014, legal guidelines informing the management of 213,844 PAs in 193 countries, both private and publicly-owned, have been established as the backbone of natural resource conservation by the International Union for the Conservation of Nature (IUCN). While guidelines to establish an area as a PA are in place, many countries have not adapted the guidelines to local conditions (Brown et al., 2019; Chape, Abbot, Spalding, & Lysenko, 2005). In some of these countries where local communities were not recognized as stakeholders in PA management, there have been negative perceptions of PAs and resistance against biodiversity conservation initiatives (Chape et al., 2005). Several studies demonstrate that positive perceptions towards PAs are crucial to achieving conservation goals (Baral & Heinen, 2007; Bennett, 2016).

In most developing countries, the "fence-and-fine" approach (considered as prioritizing wilderness over people) has been guiding the management of PAs for many years but frequently has been ineffective in reducing anthropogenic activities that negatively affect biodiversity conservation (Barrett, 1995; Furze, De Lacy, & Birckhead, 1997; Michaelidou, Decker, & Lassoie,

2002). This approach, in which human presence is seen as incompatible with biodiversity conservation, has often failed to achieve effective PA management and, then, has been criticized as biodiversity conservation failure (Brandon, 2005; Miller, Minteer, & Malan, 2011; Osipova et al., 2018). Arguments have been made in favor of a "participatory" approach, in which concerns the livelihoods of local communities and respectful interpersonal relationships are balanced with the management of PAs (Kremen et al., 2008; Schwartzman, Moreira, & Nepstad, 2000; Stern, 2008; Sunderland, Ehringhaus, & Campbell, 2007; Viteri & Chávez, 2007).

A participatory approach to conservation that considers livelihoods requires an understanding of the link between ES and the socioeconomic wellbeing of local communities (Dawson, Martin, & Danielsen, 2018; García-Llorente et al., 2018; Serenari, Peterson, Wallace, & Stowhas, 2017). The objective of this study was to explore how protected ES affect the socioeconomic wellbeing of communities settled in the proximities of a PA. The study was carried out in Gishwati-Mukura National Park (GMNP) in Rwanda. The following main research questions guided the research: 1) To what extent do rural communities living adjacent to Gishwati-Mukura National Park rely on resources from this park? and 2) What are enabling factors that support (or assist) PES to promote both tropical forest conservation and socioeconomic wellbeing of communities located around the forest in developing countries? To answer these questions, I further explored the following sub-questions: 1) How does socioeconomic wellbeing of households influence the use of resources from PA? and 2) What are community perceptions about the Gishwati and Mukura forests becoming a protected area and what factors shape and affect such perceptions?

Ecosystem services from PAs as an integral part of the socioeconomic wellbeing of communities

ES provide many raw materials (e.g., plants, animals, water, and minerals) that are transformed into or used to produce economic products. Some believe that economic valuation of ES is needed to understand better how ES can be defined, valued, and allocated to reach the sustainable use of ES (Costanza et al., 1997; Fisher & Kerry Turner, 2008; Iniesta-Arandia, García-Llorente, Aguilera, Montes, & Martín-López, 2014). Economics is defined as "the study of the allocation of limited or scarce resources among alternative, competing ends" (Daly & Farley, 2011). Within this definition of economics, the importance, or value, of an ecosystem can be categorized into one of three types of values: ecological, sociocultural and economic. In this context, the term 'ecosystem value' is considered as the contribution of an ecosystem to user-specified goals, objectives or conditions (Farley & Costanza, 2010).

Ecosystem valuation is then considered as the process of expressing a monetary value of ecosystem goods or services. The value of a service is evaluated by its contribution to maintaining the health and integrity of an ecosystem (intrinsic value) and by its contribution to satisfying human needs (instrumental value). The intrinsic value of a service is explored by understanding the ecology of the ecosystem, while instrumental value is assessed by evaluating the material benefits of a service to end-users. Understanding the ecological value of an ecosystem is important for its effective management. Considering the concept of "ecosystem value" as the degree to which an ES contributes to an objective or a condition in the same or different ecosystem(s) (Costanza et al., 1997), in this paper, ecological value refers to causal relationships between different services in an ecosystem (e.g., in a forested ecosystem, trees contribute to water filtration or soil nutrient retention by controlling soil erosion).

Ecosystem functions influence the nature, the quality, and the quantity of ES that are socioculturally important to humans. Various other factors are also important in determining what ES are important to humans and how ES are perceived by beneficiaries (Moutouama, Biaou, Kyereh, Asante, & Natta, 2019). Gender and age affect people's perception of provisioning, supporting, and cultural services (Iftekhar & Takama, 2008). In some cultures, provisioning services are valued at a higher percentage by women (food and fuelwood) while men are more drawn to cultural services (religious practice and medicinal plants) (Mensah, 2017). As an example related to age, young generations are less likely to value supporting services (e.g., soil formation and quality) than adults and older people because younger people are less involved and experienced in farming activities and other sociocultural activities that benefit from supporting services (Iniesta-Arandia et al, 2014).

An integral part of the life of humans is rooted in sociocultural practices and belief systems, which explain the environmental identity and behavior towards nature and specific ecosystems in general (Fresque-Baxter & Armitage, 2012). Environmental identity refers to a way in which people identify themselves based on their history, emotional attachment, and connection with nature which influence perceptions and attitudes towards the environment (Clayton & Opotow, 2003). In terms of peoples' history with environment or nature, the space-based connection can be influenced by the ways people acquired the space or arrived in the space, the length in that environment, the type/nature of the environment, activities done within that space, as well as what benefits or ES are provided by that specific environment. In recent years, the sociocultural assessment of ES has become an important tool in understanding people's attitudes towards ES and their reliance on goods and services provided by various ecosystems (Chan, Satterfield, & Goldstein, 2012; Iniesta-Arandia et al., 2014).

Despite the value of sociocultural integration in ES assessment, little knowledge exists about the wellbeing of people and the contributions that ecosystems make to enhance their socioeconomic wellbeing (Iniesta-Arandia et al., 2014). In this paper, sociocultural value is considered to be the importance people, as individuals or as a group, assign to ES (Scholte, van Teeffelen, & Verburg, 2015). People assign sociocultural values to ES based on their beliefs, their knowledge, and their experience with ES that are subject to valuation. Sociocultural values are conceptually different from cultural ES, as they reflect both material and non-material services, while cultural values focus on non-material services that enhance the wellbeing of people (e.g., spirituality, aesthetic, and sense of place) (Small, Munday, & Durance, 2017). When considering the wellbeing of people, it is important to consider both the social and cultural valuations of ES among the key factors in achieving both the socioeconomic wellbeing of people and the conservation of biodiversity.

As mentioned above, services provided by ecosystems are essential to support and sustain the life of human beings and other living entities. The economic value of ES is not about just financial inputs and outputs of ES within a market that considers both the unpriced and non-market ES. While human beings benefit from provisioning services, both regulating and cultural services have economic values that usually are taken for granted and, often, not considered when making decisions about the preservation of ecosystems (Hanley, Shogren, & White, 2019). Based on the contributions of ES to human welfare, the total global annual ecosystem services industry was estimated at $125-$145 trillion and, due to land use change (mainly with deforestation involved), this value demonstrated a drastic decrease by an estimated US $20 trillion per year between the years 1997 and 2011 (Kubiszewski et al., 2017). According to Kubiszewski et al. (2017), this decrease is significant enough to draw the attention of policymakers to establish and implement

ecosystem management strategies. It is not enough just to be aware that a decrease in ES value has an impact on both biodiversity conservation and socioeconomic wellbeing of people. A further step is needed to interpret how a decrease in the total annual value of ES at a local scale may affect the socioeconomic wellbeing of local communities, and then take action to address the problem at the local level and, more importantly, at the individual and household levels (Bush, Hanley, Moro, & Rondeau, 2013). While addressing the problem at the local level may require extensive resources, working directly with those whose wellbeing is affected by the ES will provide in-depth knowledge and clarification on how to solve the problem (Moutouama et al., 2019).

As a starting point in that discussion, the definition of wellbeing used in this paper is based on the understanding that "wellbeing arises from what people have, what they can do, and how they think and feel about what they both have and can do" (McGregor, McKay, & Velazco, 2007, p.110). Based on this understanding, community wellbeing is characterized by a mix of conditions such as social, economic, environmental, cultural, and political attributes that allow individuals, households, families, groups of people or communities to have all or most of what they need in order to meet their livelihoods' demands and excel in all their endeavors. Most definitions of community wellbeing agree that it is a state characterized by access to basic necessities of life including, but not limited to, secure and adequate livelihood, shelter, clothing, formal education, healthy life, good environment (clean air, clean water), and good social relations that include social cohesion, mutual respect, and the ability to achieve a sustainable living (Blewitt, 2017). This notion of wellbeing advocates that it rests heavily not only on economic resources or what material items people possess, but also on what people stand for, can do, as well as what they aspire to do and to be (Appadurai, 2004; Swift, 2006).

Various theories have acknowledged the interconnection between the economic and social wellbeing of communities, and most of these connections are easily quantifiable using measures of income, poverty level, education and employment (Clark & Oswald, 1996; Diener, 1994; Granovetter, 2005; Narayan, 2002; Woolcock, 2001). Using these indicators to assess the level of communities, various studies show that communities around PAs tend to be poor, often characterized by less formal education, and are often left out of decision-making, which can demotivate communities to engage in biodiversity conservation initiatives, especially those around PAs (Ghulam & Tsuchiya, 2017; Li, 2006). Coupling this lack of motivation to engage in conservation activities with the lack of enough resources to meet livelihood needs, marginalized communities settled in the proximities of PAs can become a hindrance to achieving effectiveness in the management of PAs. As mentioned by Naughton-Treves et al. (2005), in order to achieve PA effectiveness, "attention must be paid to the broader policy context of biodiversity loss, poverty, and unsustainable land use in developing countries."

This research explored how the socioeconomic wellbeing of four communities is affected by Gishwati-Mukura National Park located in the northern part of Rwanda and what perceptions about the PA do members of these local communities have. In search for agricultural fields, land for cattle raising, and various other activities geared towards socioeconomic development (e.g., charcoal making, mining, and timber harvesting) communities around this park heavily use the PA to meet the basic needs of life. An understanding of the perceptions of communities around Gishwati-Mukura National Park about the protection and the management of the park could contribute to its effective management.

Methods

Study area. The research took place within Gishwati-Mukura National Park, Rwanda and in four communities located within 5km of the park: Gihira, Mubuga, Nyagahinika, and Rundoyi. The park is located in the northwestern part of Rwanda (Figure 3-1), a central African country located south of the Equator, between $1^{o}4'$ and $2^{o}51'$S and $28^{o}53'$ E. Rwanda is known as the country of a thousand hills, with an average altitude of 1700 meters. With its land surface of 26,388 km^2, Rwanda hosts a population of roughly 11.92 million people. About 91% of the population of Rwanda live in rural areas. Rwanda faces many challenges including poverty, high population density and the scarcity of natural resources needed for a population of roughly 90% that heavily relies on subsistence agriculture (Musahara et al., 2010). Rwanda is ranked by the Business Insider as the 18th poorest country in the world, with a GDP per capita of $754.82 (Nyoni & Bonga, 2019). Despite efforts to protect its environment, and partly due to the high demand of natural resources caused by the population increase, Rwanda has experienced a decline in multiple ecosystem services that affect human wellbeing and threaten biodiversity in its PAs, including in Gishwati and Mukura forests (Stainback & Masozera, 2010).

The Gishwati-Mukura National Park is comprised of two tropical montane forest remnants (Gishwati and Mukura) about 88 km apart; the intervening landscape is occupied by human settlements and social infrastructure with large-scale cattle ranches, small-scale farming, and small patches of non-native tree plantations (Dawson & Martin, 2015). This research focused only on the forest of Gishwati which has elevation ranging from 2000 to 3000 meters above sea level, and sits in the Albertine Rift, a biodiversity hotspot (Plumptre et al., 2001). The temperatures in Gishwati forest are generally cool, with the mean daily minimum and maximum temperature of

15°C and 24°C, respectively, while the mean annual rainfall is 1800mm (Chancellor, Langergraber, Ramirez, Rundus, & Vigilant, 2012; Nyandwi & Mukashema, 2011). The forest has a history of heavy human disturbance. It was classified as a natural reserve in 1930. It hosts about 58 species of trees and shrubs, including numerous indigenous hardwoods and bamboo. Gishwati forest is home to endangered primates, including the chimpanzee (*Pan troglodytes schweinfurthii*) and golden monkey (*Cercopithecus mitis kandti*) (Barakabuye et al., 2007). There are approximately 35 chimpanzees, 209 species of birds (with 20 species endemic to the Albertine Rift and 10 on the IUCN Red List), and a number of amphibians and reptiles present in Gishwati forest (Clay, 2019; Kisioh, 2015).

Gishwati forest has been reduced from 28,000 hectares (size in 1970) to 886 hectares (size in 2008). The reduction in forested area was a result of deforestation due to the conversion of the area to settlements, agricultural lands, and pastures, as well as to the harvesting of timber and to energy usage. In 1981, because of a World Bank-sponsored project known as the Gisenyi, Byumba and Kigali project, authorized by the Rwandan government, the Gishwati forest lost about 12,500 hectares of its forest, which were converted into grazing land. After the 1994 genocide in Rwanda, nearly 95% of the reserve's forestland was occupied by returning genocide refugees who had been forced into exile in 1959 for political reasons (Ford, 1990; MINIRENA, 2004). When Rwanda's civil war was over in 1994, people began returning from refugee camps, especially those who had been in exile since 1959. Many of them had no other place to live and cleared the forest in search of arable soil, pasture for their cattle, and resources for their daily livelihoods, such as firewood and timber for house construction (UNEP, 2009). Over the years, as more people continued to arrive in Rwanda from exile, they moved into Gishwati forest, cultivated larger areas, and cleared the forest to create pastureland.

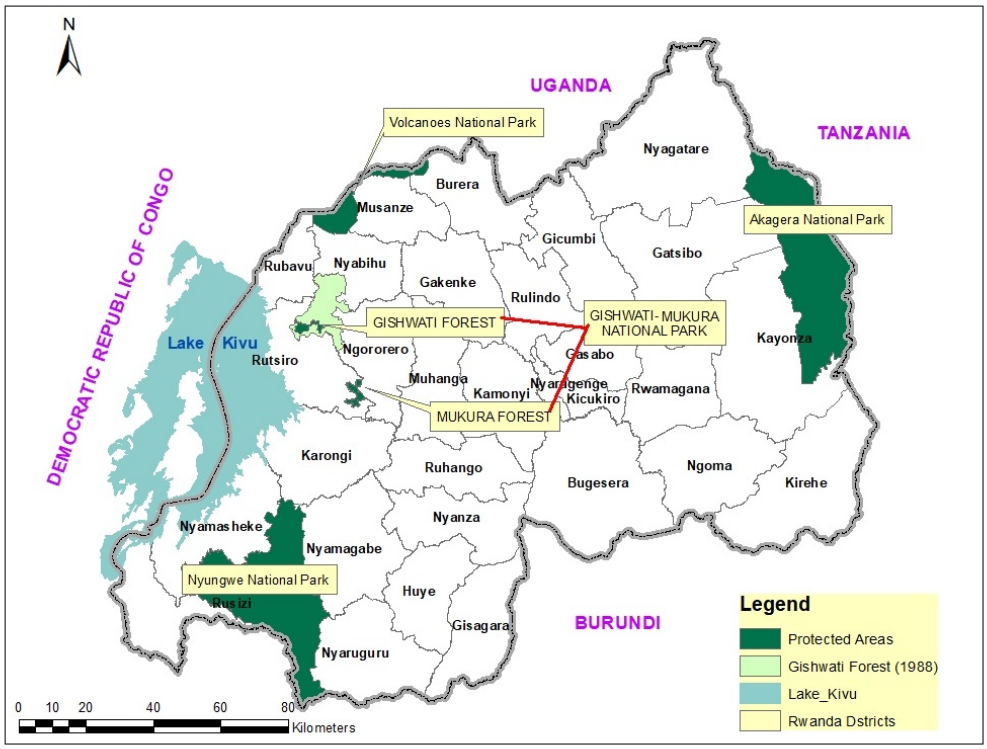

Figure 3- 1. Gishwati forest and Mukura forest, which together comprise the Gishwati-Mukura national park, Rwanda. *Source: (image created by author).*

It was not until late in 2015 that the government of Rwanda designated this forest and its adjacent forest, Mukura, as a national park. Under this forest protection act, new legal demarcation of the forest boundaries and the removal of inhabitants from within were ordered, increasing the size of the forest to 3667 hectares and reducing illegal activities such as honey collection, poaching, mining, cattle grazing, clearing for agriculture, and charcoal making. Some initiatives were taken to enforce the protection of the Gishwati forest. The "Community Forest Protection Initiative" is one of the new approaches that aims to help communities surrounding the forest to play an active role in its protection (Kisioh, 2015). Some of the members of communities are involved in patrolling and monitoring illegal activities in the forest, while others serve as advocates

for biodiversity conservation. In 2012, a non-governmental organization (NGO) known as the Forest of Hope Association (FHA) was created to continue the mission of the Gishwati Area Conservation Program (GACP), an international NGO that worked on the conservation of the Gishwati-Mukura National Park from 2008 through 2011. Both GACP and FHA have contributed significantly to the reduction of illegal activities in the forest, the implementation of new boundaries of the park that increased its size from 886 to 1484 hectares, and the increase in the number of chimpanzees from 13 to 35.

Relating to socioeconomic benefits, local jobs have been created (GACP employed 29 people from local communities and, currently, FHA employs about 15 fulltime staff, of which 11 are local); 13 eco-clubs were created in local schools; and local communities are taking ownership to improve tourism industry in the area (Kisioh, 2015). In the effort to 1) decrease illegal activities in the forest, 2) support communities around Gishwati-Mukura National Park, and 3) reforest the park, the government of Rwanda, through the Rwanda Environment Management Authority, created a five-year project known as the Landscape Approach to Forest Restoration and Conservation (LAFREC) project with World Bank funding (Bagstad et al., 2020).

Research design. Data were collected from October 2018 to February 2019 and between September and October of 2019. Before starting data collection, I selected two field assistants from the University of Rwanda based on their previous research experience, availability, and interests with the subject. I trained both field assistants for a week on the methods to be used. After the training, we spent time becoming familiar with the communities that were selected to participate in data collection. Some of the activities included: meeting with local leaders and with community volunteers who patrol the forest and train community members about the importance of the forest, walking in the communities and around the forest to get a sense of the terrain, and meeting with

FHA staff. After starting the fieldwork, at the end of each day, all three interviewers participated in a debrief meeting to review how the data collection went and to prepare for the following day.

As this research explored local community perceptions about the new protected area and associated restrictions in the use of resources from the forest, the methods relied heavily on participants' knowledge, perceptions, and experiences to answer the research questions. A mixed methods approach was employed to be able to provide a more complete understanding of the research problem and to increase the validity through triangulation (Creswell, 2010). This mixed methods approach followed a convergent parallel design, meaning both qualitative and quantitative data had equal value and were collected at roughly the same time. Both data strands were then merged for interpretation of the overall results (Creswell & Plano Clark, 2017).

The convergent parallel design allowed me to collect and analyze two independent strands of quantitative and qualitative data at the same time and in a single phase. This design allowed investigation of convergence, divergence, contradictions, and relationships of the two sources of data during the interpretation phase and allowed for stronger data interpretation compared to other mixed or non-mixed method study designs (Creswell & Plano Clark, 2017).

Community perceptions data collection design. The mixed methods study design encompassed four participating communities known as cells corresponding to the fourth level of administration in Rwanda. In each of the four communities, 30 households were interviewed for a total of 120 households for this research. As this research was aimed at capturing information about people as they experience their natural environment in everyday circumstances, the mixed methods approach offered an empirical and theoretical understanding of larger social complexes of actors, actions, and motives behind the use of forest resources (Feagin, Orum, & Sjoberg, 1991).

To ensure all the communities adjacent to the Gishwati forest were given equal opportunity to be selected for inclusion in this study, the communities around Gishwati forest were stratified into quadrants based on the cardinal points with 5km width from the forest edge. This distance was considered appropriate to capture the socioeconomic effects or interactions between the forest and the communities (Hartter, 2009). A community within each quadrant was selected randomly using the simple random selection method until four communities were identified for this research. Within each of the selected communities, households were selected for interviewing and survey using a geographically stratified random sampling technique. This technique uses ArcGIS to generate a set of random geographic coordinates and those coordinates served as centers of the sampling study area to be known as a 'superpixel', a method that was developed by (Hartter, 2009). The superpixels that were within the forest were removed because no households are located in the interior of the forest. In each of the four participating communities selected, ten superpixels were randomly selected and numbered 1-10 (Figure 3-2).

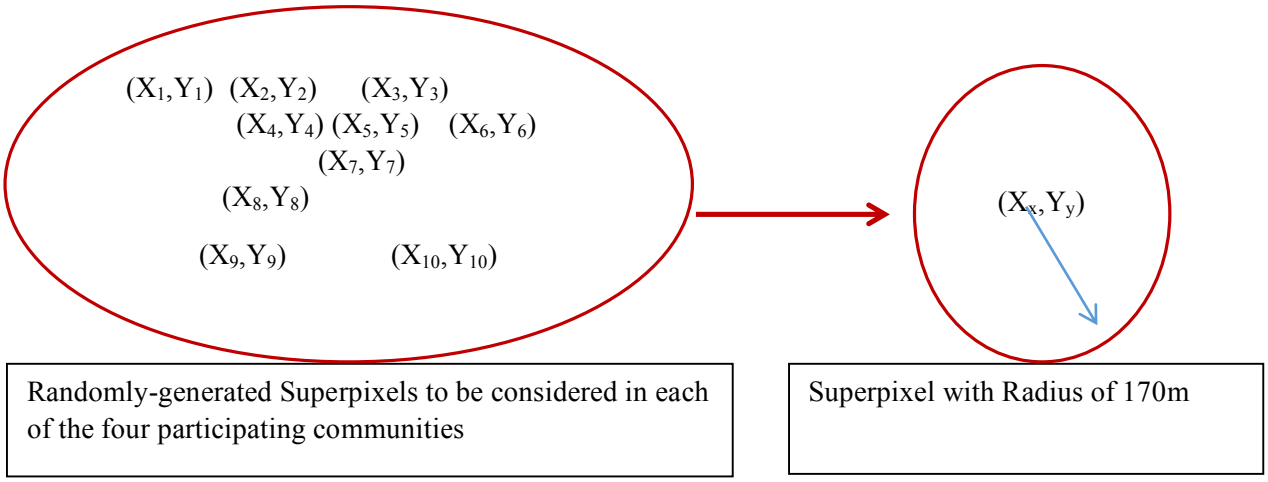

Figure 3- 2. Superpixel and household selection with XxYy representing a superpixel of 170m radius; within the superpixel, ten households were randomly selected to participate in this research.

In each superpixel three households were selected randomly to participate in the study. Thirty households in each community constituted the households to be surveyed and interviewed and no selected household declined to be interviewed (Figure 3-3). While the focus was not to explore the use of resources from the PA by gender categories, to avoid bias in the results, both men and women were given equal opportunity to participate in the study. A list of 30 selected households was split in half and for one half the head men of the households were surveyed and interviewed, and for the other group, the head women of the households participated in the study. This allowed to capture a more comprehensive picture of resources used in each household because some work is culturally gendered, such as housework for women (e.g., gathering wood, getting water, cooking, handcraft production, and cleaning) and subsistence production for men (e.g., farming, animal husbandry, and timber harvesting).

With my two research assistants, we worked with cell executives (local leaders) and conservation volunteers from FHA in each community to ensure the availability of the head man or the head woman of the household to be interviewed and respond to the survey. At the beginning of the interaction with each household representative, one interviewer explained the information on the consent form to each participant, with clarifications that the information collected would be used for academic purposes, with the promise to keep all information anonymous unless the participant decided otherwise. The survey and interviews were administrated in Kinyarwanda and took about one hour to be completed. Members of the research team were responsible for writing down the responses, as most of the participants did not know how to write. The same procedure was conducted at each of the participating households.

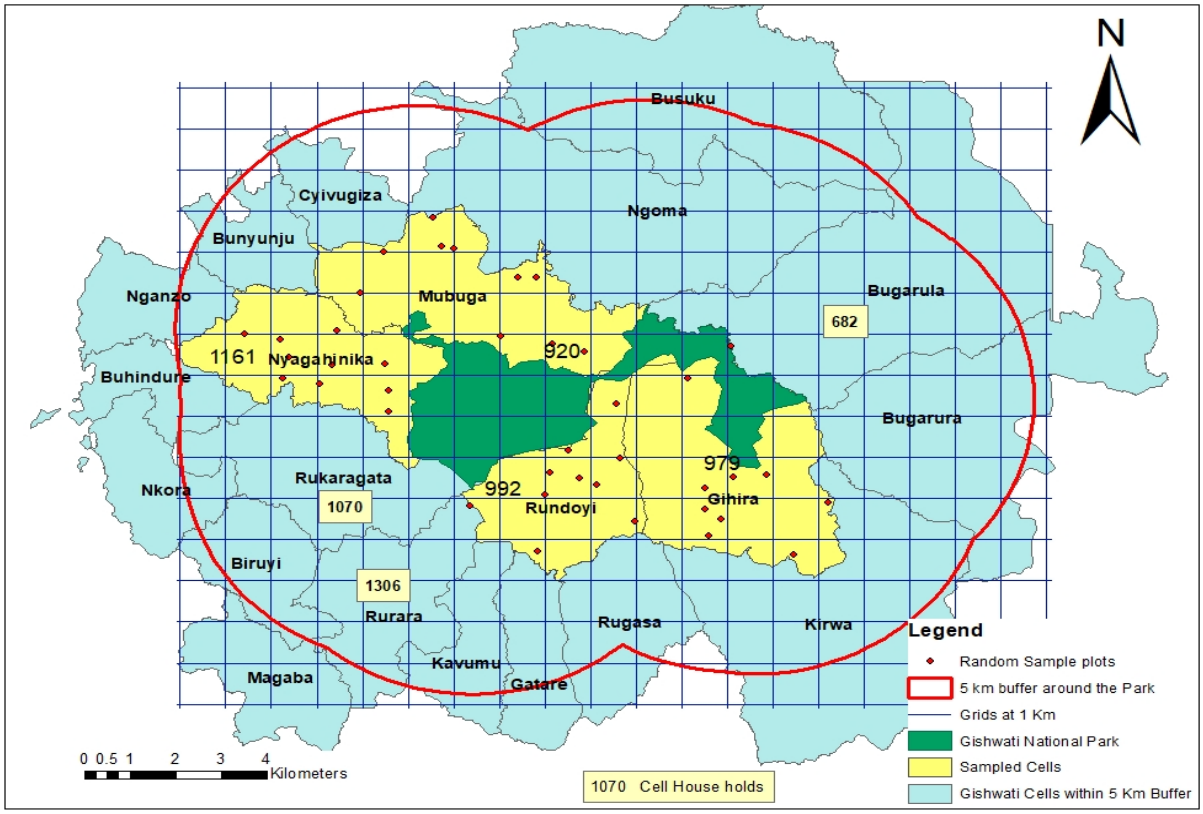

Figure 3- 3. Map showing all communities (cells) within 5km of Gishwati forest, Rwanda with superpixels (in red) where communities were selected for inclusion in the study. *Source: (image created by author).*

Household surveys. A survey was used to collect information related to what direct and indirect benefits (resources used by people) households received from the forest before and after the forest was protected, how often each household used those resources, and whether the resources are used directly in the households or are sold for income-generation purposes. Questions about household incomes were asked as income is one of the criteria used in Rwanda to classify households into six socioeconomic classes known as 'Ubudehe categories', which are based on household living standards and economy and range from the poorest households (Category 1) to the richest households (Category 6). While being in the compound of each of the participating

household, members of the research team made observations and took notes about any forest-related resources present at the house to enrich the quantitative information collected through the survey about resources from the forest used by households.

Semi-structured interviews. Right after the survey was completed for each household, we proceeded with an interview. Interviews were conducted in Kinyarwanda and took about 30 minutes. Only one person representing the household (who responded to the survey) was involved in the interview process. The semi-structured interview format allowed a deep understanding of the responses by permitting each participant to respond freely to the questions with minimum guidance (Appendix 2). This format made it easier to discuss topics that may be sensitive in nature and, on some occasions, follow-up questions were improvised based on the conversation with the participant. Interview scheduling was limited to times when interviewees had enough time to be interviewed and were not rushing to carry out other activities. I then transcribed the interviews as they were digitally recorded, and translated transcripts from Kinyarwanda into English, and a professional translator double-checked and confirmed my translation.

Focus group discussions. To validate the information from analyzed interview transcripts and surveys, focus group discussions were held in September and October of 2019 to gather information to confirm the data and to catch discrepancies in responses. One focus group was conducted in each of the four participating communities and included four local cell executives from participating cells, four conservation volunteers who assisted during interviews, about three randomly selected people who participated in interviews, and about three randomly selected members of the communities who were not involved in this research for the first time. Focus groups were held at each cell's office with the exception of one that was held at the FHA center. About 15 people (with equal representation of men and women) participated in each focus group,

with about four hours allocated to each focus group discussion. I started the focus group discussions by asking participants to introduce themselves, then I explained what my research is about, which was followed by participants signing consent forms. I then led the discussions for an hour with three guiding questions: 1) What impacts (positive or negative) do you think Gishwati forest as a PA has on communities settled in its proximities? 2) What is your perception about the current existing governing structures in engaging members of communities around Gishwati forest in the management of the forest?, and 3) If you were in charge of managing a PA, what strategies would you put in place to achieve PA management effectiveness? We then broke participants into three groups of five people to continue discussions in small groups. I led one group, and my two research assistants each led the two other groups. All three groups then reconvened to present summaries from each group. Before ending the focus group session, my research assistants and I read the summary notes to all participants to make sure we correctly noted what was presented by each group.

Human sign in Gishwati forest

Forest observations. The presence of human activities in Gishwati forest was sampled to understand how people are using the forest. Guided by one of the forest guards who is familiar with the forest, researchers followed existing paths in the forest interior and along the forest edge. In each of the four participating communities, one existing path in each of the four communities was surveyed for about 800m in length. Quantitative data about the signs such as tree cutting, bamboo cutting, honey collection, snaring and trapping, poaching, building of huts and camps, mining, cattle grazing, clearing for agriculture, bush burning, or charcoal making were noted. For each category, the number of signs in were recorded along with their respective GPS coordinates.

Data analyses. Interviews and notes from focus groups were coded to allow synthesis of similar categories into six major themes. Results from the qualitative and quantitative analysis were then compared and synthesized in order to inform the interpretation of the integrated results. Nvivo 11 software for Windows was used to analyze the qualitative data generated from interviews and focus groups sessions. To supplement or confirm the information received through interviews and surveys about the resources from the park used by local communities, the information about human signs in the forest was organized and grouped into categories (based on the nature of the signs observed). The quantitative data were analyzed using Stata software for descriptive statistical analysis. The correlation (not causation) between the location of each community and the signs of human activities in the forest were analyzed. Multiple relationships were examined among various variables that include: 1) formal education level and the reported use of ES from the park by interviewees, 2) income level and the reported use of ES from the park by interviewees, 3) the size of land/land ownership and the reported use of ES from the park by interviewees, and 4) proximity to the forest and the reported use of ES from the park. These correlations were analyzed using the Stata software and results are presented in the next section.

Results

To explore the relationship between the socioeconomic wellbeing of communities in the proximity of Gishwati forest and the perceptions of the communities about the protected status of this forest, data about each of the four communities (collected through interviews) were analyzed to better understand the following: 1) how people acquired land, 2) the size of the land owned, 3) the level of formal education, 4) the source of income for the people in the community, and 5) their perception about the protection of the forest. These were considered with the hypothesis that: 1)

those with no or minimal land, 2) with no formal education, 3) with no source of steady income, and 4) with negative perceptions about forest protection were more likely to engage in illegal forest activities, especially collecting resources from the forest.

Land use and land acquisition. The studied population is characterized primarily as farmers, with about 68% practicing agriculture (both subsistence and commercial) (Table 3-1). While land-related activities are the main source of income to the studied population, participants in the study acknowledged that their lands are worth more than they are willing to pay to retain the lands. This is mainly due to: 1) the increase in crop raiding by mostly chimpanzees that reduces crop production, 2) a complicated crop raiding compensation process, and 3) the uncertainty of future ownership of the land because of the expansion of park boundaries that make these lands less attractive to agricultural investments.

Table 3- 1. *Type and value of land owned by interviewed people from communities living adjacent to GMNP, Rwanda*

Land type by this study's participants	Freq.	% of respondents by land type	Total land size (Ha) by category	Total land value per participants (Rwf)	Total Amount participants are willing to pay to retain or own the land (Rwf)
Subsistence agriculture	83	68.04	89.76	504,750,000	177,650,000
Natural forest/woodland	25	20.49	37.15	360,550,000	119,150,000
Grassland pasture	7	5.74	49.95	159,300,000	54,600,000
No land	5	4.1	0	0	210,750,000
Wetland	1	0.82	0.25	1,000,000	0
Cash crop plantation	1	0.82	8.87	47,750,000	12,800,000

To explore land acquisition within the proximities of the Gishwati-Mukura National Park I classified ways people acquired land into the following five categories: 1) People with no land, 2) People who bought their land, 3) People who inherited land from their families, 4) People who rent their land, 5) People who were given the land by the government of Rwanda through the

resettlement process that began after the 1994 Genocide against Tutsi. As shown by Figure 3-4, the majority of people interviewed either bought their land or have been given their land by the Government of Rwanda. There was no significant difference in the ways people acquired land and the use of forest resources for the studied population ($\chi 2 = 0.05892$, $p = 0.8082$).

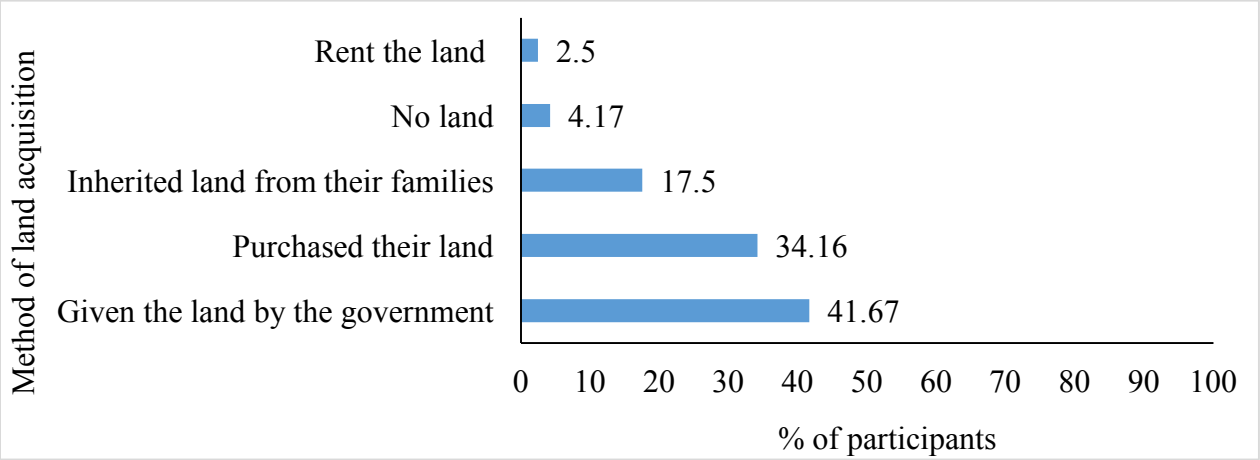

Figure 3- 4. The different ways that community members participating in the study acquired land around GMNP, Rwanda.

Analysis showed that 86% of those with land have less than one hectare of land used for food production, cattle grazing, and small patches of forest for firewood (Table 3-2). Such small size of land is all the majority of the study's participants have to support a family of six (average household size). Households in this study have similar characteristics to 55% of rural households in Rwanda based on data from a country-wide rural land distribution study showing that ~24% of all households have ~70% of the agricultural land, with an average of two hectares per household, ~30% of households own 25% of agricultural land with an average of 0.6 hectares per household, 25% of households have 6% of the country's agricultural land with an average of 0.11 hectares per household, and 11% of households are landless (Clay & Zimmerer, 1996; IMF 2013).

Table 3- 2. Land ownership distribution for the study population living around GMNP, Rwanda

Land size range (Ha)	Freq.	Percent
2.1 +	3	2.48
1.51 - 2	6	4.96
1.1 - 1.5	2	1.65
0.51 - 1	37	30.58
0.1 - 0.5	68	56.20
0.00	5	4.13

Only 2.4% of the studied population owns land that is more than two hectares in size—land used for agriculture and pasture. With the hypothesis that those with small or no land will be more likely to use forest resources, Fisher's exact test (p=0.757) shows no significant difference in the size of land owned and the reported use of the forest in the last five years. Table 3-3 shows the percentage distribution of participants according to the land size groups and the use or non-use of forest resources.

Table 3- 3. *Forest resources use by the study participants classified according to size of land owned or rented by interviewed people from communities living adjacent to GMNP, Rwanda*

Land size groups (Ha)	% of participants who reported they do not use the forest	% of participants who reported that they use the forest	Total
0	4.76	0.95	5.71
0.1 - 0.5	35.24	20.00	55.24
0.51 - 1	23.81	6.67	30.48
1.1 - 1.5	1.90	0.00	1.90
1.51 - 2	3.81	0.00	3.81
2.1 +	1.90	0.95	2.86
Total	**71.43**	**28.57**	**100.00**

Both those owning small lands and large lands reported that resources from their lands are not enough, and they need to use forest resources to supplement what comes from their own lands (Figure 3-5).

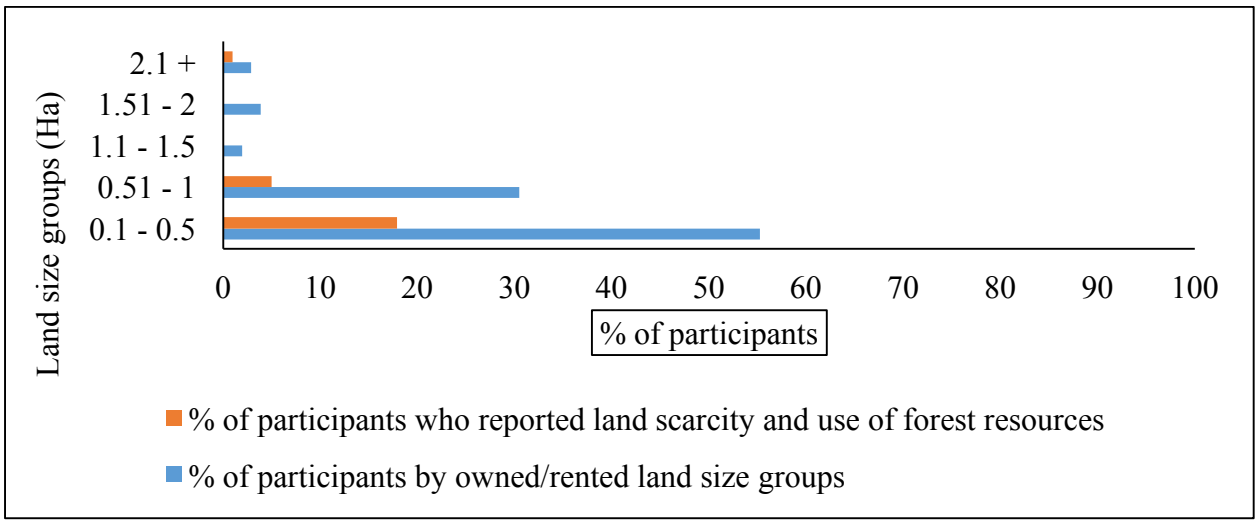

Figure 3- 5. Participants' responses to land scarcity issue as the driving factor to use forest Resources in the communities around GMNP, Rwanda.

As there was no significant difference in illegal use of forest resources and the size of lands owned by participants in the study, I considered other factors such as education and job type that may contribute to the ways people rely on forest resources, and how they perceive benefits from the PA.

Education and nature of jobs. The information related to the education level of all members from each of the participating households was recorded during this study. I categorized the formal education level in four categories: 0) No formal education 1) Some formal education, 2) Primary-level education, 3) Secondary-level education, and 4) College/university-level education. As shown in Table 3-4, formal education in the studied communities is mainly up to the primary level.

Table 3- 4. *Level of formal education (in Percentages) by interviewed people from communities living adjacent to GMNP, Rwanda*

Cell Name	No formal Education	Some formal Education	Primary	Secondary	College/ University Education
Gihira	21.94	8.67	42.35	25	2.04
Mubuga	22.04	2.15	48.92	22.58	4.3
Nyagahinika	28.57	22.62	42.26	5.36	1.19
Rundoyi	26.38	15.95	34.36	22.09	1.23
Total	**24.54**	**11.92**	**42.22**	**19.07**	**2.24**

In the Nyagahinika community where most of the signs of illegal use of forest were detected, only about 6.6% of all members from the households that participated in this study had a secondary or university level of education. The three other communities had at least 20% at the secondary or university level (secondary means high school). There was no significant difference in education level and the way people use forest resources ($\chi 2 = 0.012883$, $p = 0.9096$).

As there was no difference in education level and the ways people use forest resources in the studied communities, I explored a third hypothesis that the more formal education people have, the more likely they are to have jobs that don't require the use of land or forest resources to make a living. In Nyagahinika community, where only 5.3% of respondents have at least a secondary level of education, 51% of participants have jobs working in the tea plantations or farming for others, and compared to other communities, only a small number (5%) have no jobs (Table 3-5). Even though members of this community have less formal education compared to those from the three other communities, they have jobs and steady income.

Table 3- 5. *Type of jobs (in percentages) by interviewed people from communities living adjacent to GMNP, Rwanda*

Job Type						
Cell Name	No Job	Farming	Business owner (commerce)	Seasonal Hourly Labor	Full Time Salaried Employee	Other (e.g., traditional healers, Environmental volunteers)
Gihira	21.13	59.15	5.63	7.04	0	7.04
Mubuga	26.67	46.67	1.33	14.67	2.67	8
Nyagahinika	**5.48**	**50.68**	4.11	**26.03**	12.33	1.37
Rundoyi	16.67	51.52	1.52	9.09	12.12	9.09
Total	**17.54**	**51.93**	**3.16**	**14.39**	**6.67**	**6.32**

There was no significant difference between the education level and the source of income ($\chi2 = 0.08903$, df = 1, p = 0.7654). The relationship between income and the use of forest resources does not show any statistical difference ($\chi2 = 0.012883$, p = 0.9096).

Socioeconomic status and use of the forest. One possibility in the analysis was that household economic living standards (Ubudehe category) inform the illegal use of resources from the forest by local communities (Table 3-6).

Table 3- 6. *Ubudehe classification of participants from communities living adjacent to GMNP, Rwanda. 1 = Umutindi Nyakujya (the poorest), 2 = Umutindi (the very poor), 3 = Umukene (the poor)*

	Ubudehe Category		
Cell Name	1	2	3
Gihira	2.15	12.90	84.95
Mubuga	9.14	36.56	54.30
Nyagahinika	42.26	20.24	37.50
Rundoyi	11.66	21.47	66.87
Total	15.79	22.90	61.31

There was no significant difference in Ubudehe category and the use of forest resources, ($\chi2= 0.012883$, p= 0.9096). However, despite this result, those in the first category of Ubudehe expressed having no other choice other than using resources from the forest.

> As you can see, I have six children, four going to school and two young ones staying home with their mother. I told you that my land is less than half a hectare, and I have been farming the same land for more than 30 years with very limited access to fertilizers to be able to produce enough for my family. In this house, we are accustomed to eating once a day, because that is all I can afford. I struggled to send one of my children to the university and, after he finished, he went to Kigali and got a job with one of his college friend's help. Now, because I have that son in Kigali who supports me occasionally, I was put in the category 3. I told the local leaders that they should reconsider their decision of putting me in this category, because I do not deserve it. Now, it has been more than a year, and nothing has been done yet, even though I always bring this to the attention of our local leaders, especially during the regular local meetings.
>
> (Interview with participant #67)

While pending claims from some of the interviewed people from communities living adjacent to GMNP to change Ubudehe categories, this analysis found that out of about 28% respondents who acknowledged having used the forest illegally (collecting firewood, honey, and fruits from the forest for domestic use) between year 2014 and 2019, 65% of these people belong in the first category of Ubudehe (poorest). They reported enduring little to no source of sufficient income and a lack of sufficient agricultural land (Table 3-7).

Table 3- 7. *Percent of people who harvested forest resources illegally in the past five years and income/year and size of land owned by participating households living adjacent to GMNP, Rwanda*

	Ubudehe Category	Annual income reported (Rwf)		Land size range (Ha)		
Cell Name	1	0	≥60000	0	0.1 - 0.5	0.51 - 1
Gihira	2.15	2.15	0.00	0.00	2.15	0.00
Mubuga	9.14	5.10	4.40	0.00	4.97	4.17
Nyagahinika	42.26	40.26	2.00	30.17	12.09	0.00
Rundoyi	11.66	6.66	5.01	1.17	8.31	2.17

Agriculture is the main source of income in this area and only a small number of people are hired to work in professional jobs, such as at the hospital, in local government, or in managing the tea or cheese factories. The lack of adequate land for agriculture and the lack of steady well-paying jobs explains the high number of people in Categories 1 and 2 of Ubudehe. The lack of

steady employment makes most of the participants in this study rely on subsistence agriculture. This subsistence agriculture is associated with the challenges of securing enough forage for their cattle due to small lands and limited resources to buy or rent land sizeable enough to practice farming activities (Table 3-8).

Table 3- 8. *Land size and land scarcity (in percentages) for cattle grazing as reported by participants involved in farming in the communities around GMNP, Rwanda*

	Land size groups (Ha)					
Job type description	**0.1 - 0.5**	**0.51 - 1**	**1.1 - 1.5**	**1.51 - 2**	**2.1 +**	**Total**
Farmers by land size category	**27.87**	21.31	1.64	1.64	0.82	53.28
Farmers who reported land scarcity for cattle raising	**6.33**	5.20	0.75	1.02	0.34	13.64
Wage labor by land size category	**2.46**	0.00	0.00	0.00	0.00	2.46
Those in wage labor who reported land scarcity for cattle raising	**0.85**	0.00	0.00	0.41	0.00	1.26

These challenges necessitate obtaining additional forage from the surrounding areas, mainly from Gishwati forest. While it is evident that the land scarcity is among the key driving factors for forest disturbance, about 90% of the studied population reported a significant decrease of direct benefits or provisioning ecosystem services (such as forage, timber, firewood, fruits, and honey) since Gishwati-Mukura became a national park specifically due to the increase in the number of park guards controlling access to the forest (Table 3-9).

Table *3- 9. The use of the forest resources after the forest received the national park status by participants from communities living adjacent to GMNP, Rwanda*

	Access to Forest Resources Decreased Due to Increase in Park Guards Increased	
Cell Name	No	Yes
Gihira	3.33	96.67
Mubuga	6.67	93.33
Nyagahinika	9.38	90.62
Rundoyi	3.33	96.67
Total	**5.74**	**94.26**

Out of 28% of the total participants who reported to use forest resources illegally in the last five years, 63% affirmed their access to the forest for illegal use has decreased because of increase in guards that protect the forest since it became a national park. By contrast, only 37 % attributed their reduction in illegal use of the park's resources to biodiversity protection sensitization campaigns and meeting that have been organized by local leaders and FHA.

> While illegal use of forest resources decreased since the forest became a PA as mentioned above, about 30% of the studied population reported seeing no benefits of having a PA because of the strict rule to stay out of the forest no matter the reason. Most participants stated that Gishwati-Mukura National Park belongs to the government and that the best way for them to stay out of trouble is to consider the forest as nonexistent to them.
> What else can we do? We have to abide by the rules; otherwise, we can find ourselves paying fines or being taken into jail. We have no choice. Maybe what you people can do is advocate for us so that, at least, we can benefit from it in some ways, like ecotourism, or economic infrastructure we hear our local leaders talking about, that will be put in place to increase tourism. Maybe this way, we will benefit in the longer term because otherwise farming is failing us due to multiple reasons as I mentioned to you.
>
> (Interview with participant #102)

Farmers' relationship to the forest. The majority of those who practice farming reported that within the past five years, crop production has decreased significantly which may be the cause for some people to harvest forest resources as alternative sources of income. The Chi-Square test of independence shows no difference in studied communities in regards to the use of forest resources ($\chi 2$= 11.2420, df = 3, p= 0.081). As shown in Table 3-10, across the four studied communities, the number of those who reported a decrease in crop production is about the same.

Table 3- 10. *Percent of all participants' responses to crop production variation from 2014-2019 in the communities adjacent to GMNP, Rwanda*

Cell Name	Crop harvest decreased	Crop harvest remained the same	Crop harvest increased
Gihira	63.33	13.33	23.33
Mubuga	53.33	33.33	13.33
Nyagahinika	53.33	13.33	33.33
Rundoyi	73.33	20.00	6.67
Total	**61.48**	**19.67**	**18.85**

Out of the 28% who reported using forest resources, 61% faced a crop decrease, about 20% have seen their crop production remain the same, and around 19% acknowledged an increase in crop production (Table 3-11).

Table 3- 11. *Community responses about changes in crop harvest from participants who also reported illegally using GMNP, Rwanda*

Cell Name	Crop harvest decreased	Crop harvest remained the same	Crop harvest increased
Gihira	15.57	3.28	5.74
Mubuga	13.11	8.20	3.28
Nyagahinika	14.75	3.28	8.20
Rundoyi	18.03	4.92	1.64
Total	**61.46**	**19.68**	**18.86**

Those whose crop production decreased mentioned three main reasons for crop decrease including crop-raiding by primates from the forest, the loss of land due to the extension of the park boundaries, and the change in weather patterns (Table 3-12).

Table 3- 12. *Percent of participant responses to causes for crop production decrease from 2014 to 2019 in the communities adjacent to GMNP, Rwanda*

Cell Name	Crop-raiding	Park's boundary extension	Weather related
Gihira	16.00	5.33	4.00
Mubuga	13.33	8.00	0.00
Nyagahinika	9.33	13.33	1.33
Rundoyi	12.00	14.67	2.67
Total	**50.66**	**41.33**	**4.00**

The reduction in crop production due to crop-raiding and loss of lands has negatively affected the ways people see the benefits received from the forest. As one of the participants mentioned:

> I don't see any benefit now that I can't get any resources from there, and my land has been taken by LAFREC, which has not even delivered what we were promised in exchange for our rights to do agriculture in our own lands. Those who benefit from it are those who live in Kigali and get paid to remotely manage the forest without knowing how difficult it is for us here to make a living." A woman who replied to the same question is quoted as saying, "The benefits from this forest are harvested by the Forest of Hope and the people from Kigali. You see, I have five children—three are in school, one abandoned school because I have limited resources, and this little one. My husband used to work on someone's farm; he was being paid and, now that the farm is within the new boundaries of the park, the owner of the farm sold his cows and is moving to Musanze. My husband joined other neighbors to form an association, as we were told that financial support would be given to those in associations. It has been two years since were told this, and nothing has happened yet. I used to have a small land by the forest, where I was growing sweet potatoes and vegetables to feed my family and, now, I am only allowed to plant trees or tea. How I am going to feed my family? Now, I don't see any benefits of living closer to this park unless it can help us to make a living like it was in past.
>
> (Interview with participant #62)

Those with crop production that has remained the same or increased had not lost land with park boundary extension. In some cases, crop increase was associated with an increase in use of fertilizers, improved seeds, soil erosion control such constructed hillside terraces, and the use of safe pest control measures.

Community perceptions about the protected area. While facing land scarcity and changing crop production, some of the same participants stressed their concerns about losing land due to the expansion of the park boundaries and the reforestation initiatives currently in progress. This led to discussions about the Landscape Approach to Forest Restoration and Conservation LAFREC project and its implementation in the Gishwati area. About 19% of interviewees affirmed

that the LAFREC project caused them to lose anywhere from Rwf 20,000 ($23.00) to Rwf 2,000,000 ($2,300.00) per agricultural season due to the loss of land for the extension of the park boundaries. In addition to the loss of land, transparency in the implementation of the project was questioned by 20% of the participants. Some participants reported not having received what was promised to them in exchange for their land or to have received less the amount to which they initially had agreed. Those who experienced the loss of lands due to the extension of the park's boundaries expressed not receiving any benefits from having a PA within their communities (Table 3-13).

Table 3- 13. *LAFREC project and perceived forest importance by participants from communities adjacent to GMNP, Rwanda*

Affected by LAFREC Project	Do not perceive any benefit of having a PA in the vicinity	Perceive benefit(s) of having a PA in the vicinity
No (80.83%)	18.56	81.44
Yes (19.17%)	91.30	8.70
Total (without consideration of LAFREC effect)	**32.50**	**67.50**

There is a strong negative correlation between losing lands due to the extension of the park's boundaries (LAFREC Project) and the perceptions about the importance of Gishwati forest becoming a PA (r (118) = -.611, p = 1. 024.10^{-13}). While 71% of all the study's participants mentioned that they don't use resources from the forest (Table 3-3), the majority of participants expressed dissatisfaction about Gishwati forest becoming a PA (Figure 3-6). This discontent comes mainly from being asked to stop using resources from the forest, losing their lands due to the extension of the park boundaries, and not being compensated from the loss caused by the park extension or by the crop-raiding by primates from the park (e.g., participant #62).

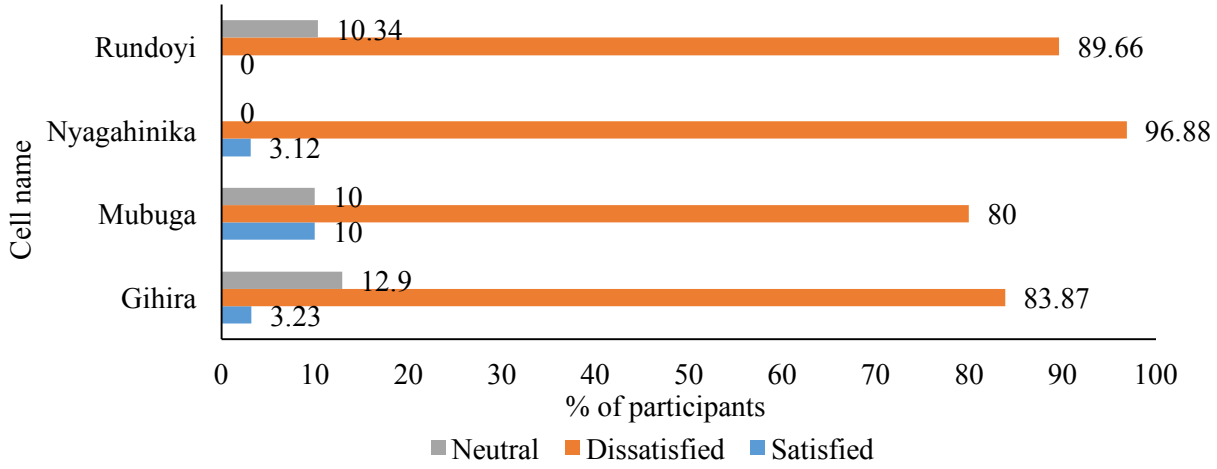

Figure 3- 6. Participant responses about their satisfaction with Gishwati forest becoming a national park.

With the high number of participants expressing dissatisfaction, it was important to explore the willingness to participate in decision making processes related to the park management and projects that affect the lives of local communities. Most participants expressed no interest in being involved in decision-making process (Figure 3-7) and they indicated this is because they have no experience nor motivation to do so. While they wish to do so, some of the participants mentioned that they have not participated in meetings organized by local leaders because they believe the meetings are to provide information about the decisions that have already been made rather than an opportunity to share ideas, concerns and find solutions together. As one of interviewees mentioned:

> Even if it was hard for me to go to the meetings as you can see my wheelchair is not good at all for the road you saw that comes to my house. I used to go to the meeting at least three times a month, then I got tired for always fighting with our local leaders because in these meetings they used to tell us what to do and what not to do, and not providing space for discussions and ideas sharing. Some of us from the community used to give comments and ideas about projects that affect us, and we got reprimanded to oppose to our local leaders. To make peace with them, we decided to give up and I can tell you that it has been at least a couple years since I attended meetings…And recently I was told that the new park boundaries will take a good part of my land where I keep my cows. I am getting old and I

have no strength to keep fighting, but if it was easy to get my voice heard, I would gladly participate in meetings.

(Interview with participant #95)

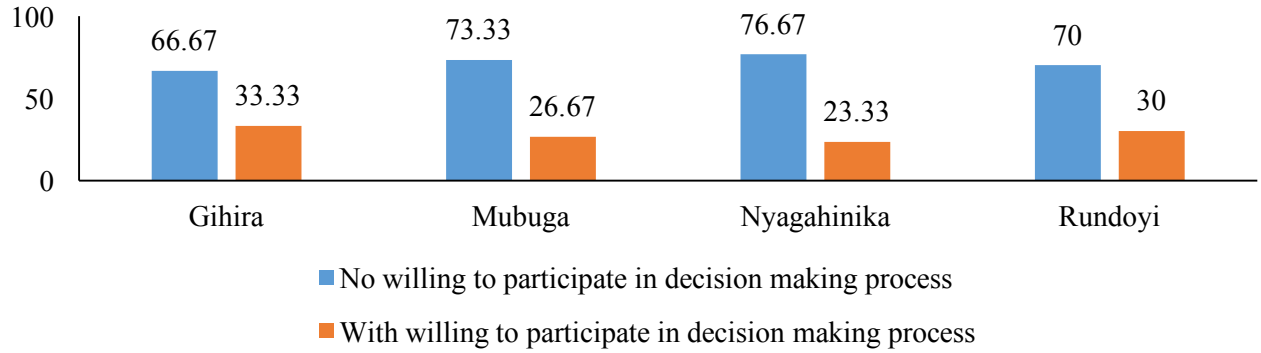

Figure 3- 7. Percent of participants willing to participate in the park management decision making process.

A further possibility considered was whether losing land due to the park's extension or being discontent about the forest's new status are associated with the willingness to engage in decisions-making process at the local meetings. Those who lost their lands due to the park boundary extension showed significantly greater interest to participate in the decision making process over the projects that affect them than those who didn't lose their lands ($\chi 2 = 55.57$, $p = 9.04\ 10^{-14}$; Table 3-14).

Table 3- 14. *Percent of participants who lost their lands due to park boundaries extension and interest in participating in decision making process*

Lost the land due to the extension of the park boundaries	No interest in participating in decision-making process	With interest in participating in decision-making process
No (80.83%)	86.60	13.40
Yes (19.17%)	8.70	91.30
Total	**71.67**	**28.33**

There was also a significant difference between those respondents who perceived there would be benefits from Gishwati-Mukura becoming a park and willingness to participate in the

decision-making process ($\chi 2 = 26.715$, $p = 2.35\ 10^{-7}$). These results show that those who are affected by the PA establishment are more likely to be willing to engage in the decision making process than those who have not been affected by the forest becoming a PA.

Human presence in the forest and forest use. While the majority of the participants in this study stated that they do not use the forest, signs of human presence in the forest were observed including newly-cut trees, evidence of forest fruit (*ibyufe*) consumption by humans, evidence of honey collection, as well as evidence of collection of grasses used to feed cattle. Forest fruit consumption was attributed to humans based on the understanding that human suck the juice out of the fruit and spill out the seeds while the animals eat the seeds. The two dominant signs observed were the consumption of forest fruits and the collection of Napier grass (*Pennisetum purpureum*). The signs were located in both the interior (800m from the forest edge) of the forest and at the edge of the forest. The greatest total number of signs were recorded in forest adjacent to Nyagahinika community with 33%, Mubuga 26%, Gihira 22%, and Rundoyi 19% (Table 3-15).

Table 3- 15. *Encounter rates of signs recorded of human presence in the Gishwati forest adjacent to the four sampled communities*

	At the forest edge (within 800m of forest edge)					**Beyond 800m from forest edge**				
Cell Name	Newly-cut trees	Hay collection	Remains of consumed forest wild fruits	Human footprints	Honey collection	Newly-cut trees	Hay collection	Remains of consumed forest wild fruits	Human footprints	Honey collection
Gihira	1.25	17.5	1.25	7.5	0.0	0.4	1.2	0.8	0.6	0.0
Mubuga	2.5	23.75	0.0	8.75	0.0	0.2	0.8	1.2	1.0	0.2
Nyagahinika	3.75	15	2.5	16.25	0.0	1.0	1.4	1.2	1.2	0.4
Rundoyi	1.25	13.75	1.25	3.75	0.0	0.4	0.6	1.0	1.0	0.4
Total	**8.75**	**70**	**5.0**	**36.25**	**0.0**	**2.0**	**4.0**	**3.8**	**3.8**	**1.0**

The Chi-Square test of independence shows a significant difference between the number of signs recorded at the forest edge and interior the forest ($\chi 2 = 128.33$, $p = 0.089$); however, there

was no significant difference between the number of signs and the studied communities ($\chi 2= 30$, df = 3, p= 0.749).

Discussion

Socioeconomic status and forest resources dependence

The vast majority of participants in this study have no or minimal formal education, which could be a disadvantage in obtaining non-farm jobs if they were available. The Government of Rwanda has made tuition free for the first nine years of formal education, but resources to cover the basic needs such as school supplies, uniform, and food are not easy to afford by many people which causes a high drop-out rate from schools (Williams, 2017). Dropping out of school at early ages has been positively correlated with marriages at the early age especially in rural areas which contributes to the population increase, hence more demand for natural resources (Amin & Al-Bassusi, 2004; Ijeoma, Uwakwe, & Paul, 2013). Other studies have shown that having a formal education and obtaining a non-farm job are among the antidotes for young girls getting married at an early age or to have undesirable pregnancies which could have ripple effects in population control and the demand for natural resources in rural areas (Groves, 2017; Lata & Misra, 2017; Masuda & Yamauchi, 2020).

The non-significant difference between education level and job type, and between job type and illegal use of forest resources in this study could be explained by the homogeneity in education status (minim formal education) and the lack of diversity in jobs availability (mostly farming) in the studied communities. Studies have shown that earning a formal education increases the chance of obtaining non-farm jobs, good enough to be able to meet the livelihoods needs and reduce the dependence on natural resources (Lepetu, Alavalapati, & Nair, 2009). Notwithstanding the land scarcity and the substantial decrease of crop-production in the studied communities, job

opportunities may arise related to the establishment of Gishwati-Mukura National Park which could play a role in improving the socioeconomic wellbeing of people in this region. Some of the opportunities linked with PAs are improved infrastructure (roads, electricity, and clean water), expanded business market, and job creation related to the needs of the tourism industry (Leung et al., 2018; Serenari et al., 2017; Weaver & Lawton, 2017). While local communities may not foresee these opportunities and only be focusing on the loss from the restriction to use the forest, their perceptions about Gishwati-Mukura being a new PA could assist the management of the PA and local leaders to understand the views and the needs of the local people.

Importance of positive community perceptions about PA management

The results show a strong positive correlation between participants' negative perceptions about Gishwati becoming a PA and their perceived experience with losing their lands to benefit biodiversity conservation. Some studies have shown that it is normal for communities to feel disconnected with an ecosystem they used to frequent and from which they derived direct benefits, when the ecosystem is given a PA status, and that such disconnection should be given attention by those involved in creating and managing the new PA (Cavanagh & Benjaminsen, 2015; Duffy, John, Büscher, & Brockington, 2016; Elvira Pereira, Cibele Queiroz, Henrique Miguel Pereira, & Luis Vicente, 2005; McShane & Wells, 2004). If not well addressed, the resistance from communities could make the management of that ecosystem a challenge when there is no "buy-in" of the conservation initiatives (Oldekop, Holmes, Harris, & Evans, 2016). While such perceptions exist on the PA status of Gishwati-Mukura National Park in Rwanda, this is the same case for PAs in many other African countries such as Namibia, Tanzania, Zambia, Zimbabwe, and Uganda (Bennett & Dearden, 2014; Engen, Fauchald, & Hausner, 2019). The major issues observed in these countries is that landowners are in favor of farming, haymaking, and securing

other livelihood needs, rather than strict biodiversity conservation. Land scarcity and the pressure to meet such demands has led to increasing deforestation rates especially in the tropics (Dobson, Bradshaw, & Baker, 1997), reducing soil fertility, significantly increasing the loss of biodiversity and associated ecosystem services (Primack, 2009).

Protecting ecosystems and supporting the livelihoods of those who directly rely on protected ecosystems while engendering positive perceptions about PAs is a major challenge for effective and sustainable PA management. As Lee et al. (2009) concluded in a study that focused on Indonesian communities, negative perceptions from communities about PAs resulted in more illegal activities such as poaching and logging, which decreased the effectiveness in PA management. Poorly implemented conservation projects in PAs could increase the chance of communities not wanting to participate in conservation initiatives or of resisting activities geared towards biodiversity protection. Some studies have demonstrated that positive perceptions towards PAs are crucial to achieving conservation goals and to achieving effectiveness in PA management (Baral & Heinen, 2007; Bennett & Dearden, 2014).

Land scarcity and decrease in crop production as drivers of illegal forest resource use

Human presence in the forest adjacent to the four studied communities located within 5km from the forest edges was evident. The signs of forage collection at the edge and interior of the forest and complaints from some of the study participants about the needs to use the forest to feed their cattle show the major constraint for livestock feed resources. While farming is the main income generation for the studied communities, participants in this study have small patches of lands where they practice subsistence farming, similar to the findings of other studies that highlight increase in land scarcity in Rwanda and especially around PAs (Ayalew Ali & Deininger, 2015; Verhofstadt & Maertens, 2014). Coupling this issue of scarcity in availability of farm lands with

other factors such as weather-related events, wildlife crop raiding, and the loss of farming lands due to park's boundaries extension contributed to a significant decrease in crop production and an increase in the lack of livestock feed resources as noted by some of the study participants. Some studies have shown that the demand for pasture areas and agricultural lands especially around PAs is projected to increase with population increase (Pretty, Toulmin, & Williams, 2011; Soesbergen et al., 2017).

The insufficient farming land per household and the reduction in crop production in the studied communities have increased the need to use forest resources to meet basic livelihood and other studies have also documented this observation (Dawson, 2018; Mutandwa & Kanyarukiga, 2016; Soesbergen et al., 2017). The strict prohibition to use forest resources has not been well received by local people, especially those who lost their lands to benefit biodiversity conservation and have seen their crop production decrease. Such discontent might explain the assertion that, over time, the fence-and-fine approach to conservation fails, because people ended up resisting the strict biodiversity conservation rules that deny them access to forest resources that they used to harvest before the PA status was given to the forest (Fabricius, Folke, Cundill, & Schultz, 2007).

While sometimes PA management measures fail to take into account the intricate traditional relationships between people and PAs, the need to integrate the socioeconomic wellbeing into the management of protected natural resources is important to achieve success (Fabricius, Koch, Turner, & Magome, 2013). With most of the interviewees facing land scarcity, non-farming opportunities could support the socioeconomic wellbeing of local communities. While non-farming opportunities could support the local economy, help communities meet their livelihood needs, and reduce forest dependence, investment in education to form citizens that could work in various sectors other than in the farming industry is important in the context of the

communities around Gishwati-Mukura National Park, Rwanda and in other developing countries (Nagler & Naudé, 2017; Rajeev & Bhattacharjee, 2017; Reardon, Taylor, Stamoulis, Lanjouw, & Balisacan, 2000).

Conclusion

This paper explores the socioeconomic wellbeing and perceptions of four communities located around Gishwati-Mukura National Park located in the northern part of Rwanda. The PA is composed of two remnant forests (Gishwati and Mukura forests) and people from surrounding communities live subsistence lifestyles, with farming being the main source of income. This case study identified factors that influence the perception of communities towards the management of the park and the use of the park's resources. The factors explored include: 1) the nature and size of the land owned by each participated household which direct what activities are done on the land, 2) the various ways households acquired land, 3) the level of formal education acquired by the members of the studied communities, 4) the level & source of income by participating households, 5) the services and disservices caused by the park enforcement, 6) the effect of the presence or absence of park guards, and 7) the level of local communities' involvement in decision-making in the management of PAs.

This study found that participants' negative perceptions regarding Gishwati and Mukura forests becoming a new PA were correlated with communities' perceived losses and experience from losing their lands to benefit biodiversity conservation. Land based challenges in the studies communities call for non-farming opportunities and new PA management approaches that could contribute in reducing the dependence to forest resources.

Overall, this study found that the socioeconomic wellbeing of the studied communities is interconnected with the park's resource availability and accessibility. While various factors

contribute to socioeconomic wellbeing, natural resources from the PA have been used to supplement the limited resources produced from the small size of lands they own. More studies are needed to explore factors such as income and occupation, education, and social cohesion that may influence people's perceptions of PA management. A comprehensive picture of the relationship with socioeconomic wellbeing could inform policy makers and government officials on what biodiversity conservation programs are need to improve both the PA management and the socioeconomic wellbeing of communities around Pas.

This paper provides a two-fold contribution: scholarly and practical factors to explore in order to achieve effectiveness in PA management. The scholarly contribution is some understanding of the role of socioeconomic wellbeing and perceptions of local communities in PA management in the context of developing countries. Some studies have provided information on perceptions and PA management, but at a macro level, and there is a need for similar case studies at the micro (community) level (Hejnowicz, Raffaelli, Rudd, & White, 2014; Wunder et al., 2008). This part of the study informs the role PES could play at a community level, as well as opportunities, challenges, and constraints expressed by local community members and various other stakeholders in environmental management in Rwanda. The second contribution is practical and informs best practices to put in place in order to achieve a sustainable and successful PES scheme geared towards improving the socio-economic wellbeing of communities within proximity of a PA, while ensuring effectiveness in PA management.

It is important to highlight that this research focused only on communities located within 5km of the forest. Even though it has been mentioned that 5km is an adequate distance within which to study the socioeconomic relationships of forest and communities (Hartter, 2009), it is

understood that communities farther from the forest may impact this national park, as they benefit from the ES provided by the PA.

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Chapter 4: Factors enabling Payment for Ecosystem Services as a tool for improved protected area management and socio-economic wellbeing

Abstract

Conflicts between protected ecosystems and people living around those ecosystems remain a persistent constraint to effective biodiversity conservation. To date, many ecosystem-related studies have focused on the importance of ecosystem services to human wellbeing and the role of payment for ecosystem service schemes to achieve biodiversity conservation. However, in order to be effective, these schemes must consider the socio-economic wellbeing of beneficiaries. Effective biodiversity conservation also requires understanding the relationship between biodiversity and the wellbeing of communities. This study explored the potential of using Payment for Ecosystem Services (PES) as a tool to enhance the socio-economic wellbeing of communities around Gishwati-Mukura National Park (GMNP) in Rwanda. This study identified factors that could make a Payment for Ecosystem Services scheme successful to both protected area (PA) management and the wellbeing of people who directly benefit from the PA. Data collected through surveys, interviews, and focus groups suggest that enabling factors such as the improvement of community livelihoods, type of incentives, community advocacy, social cohesion, country/local governance structures, socioeconomic development opportunities, and stakeholder engagement in the process are important in designing and implementing a PES scheme. This research proposes a framework for implementing PES to reconcile the conflicts between PA management and the need for socio-economic wellbeing of communities around a PA by identifying PES enabling factors and strategies to engage stakeholders in PES schemes around a PA in developing countries' PA context.

Keywords: Biodiversity conservation, community wellbeing, social cohesions, community advocacy, governance structure, stakeholder engagement.

Introduction

The concept of ecosystem services (ES) serves as guidance in the development of market-based environmental management schemes—such as Payment for Ecosystem Services (PES) —in an attempt to solve conflicts between biodiversity conservation and peoples' wellbeing. PES is a conservation strategy where land users, who often are poor, receive incentives (in-kind or cash payments) from ES buyers to motivate them to continue to protect ES on their lands and on public lands, such as PAs (Pagiola, Landell-Mills, & Bishop, 2002). To date, many ecosystem service studies have focused on the importance of ES to human wellbeing and the role of PES towards achieving biodiversity conservation on a broader scale (Ezzine-de-Blas, Wunder, Ruiz-Pérez, & Moreno-Sanchez, 2016; Neeff, 2009).

In many developing countries, rural communities heavily rely on provisioning services, and many PES projects have targeted communities and ecosystems in rural areas (Kroeger & Casey, 2007; McElwee, Nghiem, Le, Vu, & Tran, 2014; Zhang, Ricketts, Kremen, Carney, & Swinton, 2007). PES projects in African countries, as well as in other developing countries, are often for watershed management (water flow, quality, food control), forest conservation (of course, in part, due to the water flow in these forests), carbon sequestration, and soil erosion control (Bond & Mayers, 2010; Brauman, Daily, Duarte, & Mooney, 2007; Brouwer, Tesfaye, & Pauw, 2011; Huang & Upadhyaya, 2016; Stanton, 2010). However, with these PES projects, the question of who should pay for ES and who should be receiving payments is still an ethical concern facing those who design, implement, and monitor PES projects. These projects have been used as vehicles to reinforce the sustainable use of ecosystems and poverty reduction (Landell-Mills, 2002; Lipper, Sakuyama, Stringer, & Zilberman, 2009; Turpie, Marais, & Blignaut, 2008), although research

shows that many ecosystems continue to be degraded due to anthropogenic activities (MEA, 2005; Corbera, Kosoy, & Tuna, 2007; DeFries, Hansen, Newton, & Hansen, 2005; Wang et al., 2020).

Some countries such as Costa Rica have well-established PES projects aimed at reinforcing biodiversity conservation and poverty alleviation, and research has revealed that many communities participating in these PES programs have improved residents' quality of life (MEA, 2005; Pagiola et al., 2005). Since 1997, Costa Rica's land owners can receive payment in exchange for using their land for specific types of activities that are environmentally friendly (Drechsler, Johst, & Wätzold, 2017; FONAFIFO & CONAFOR, 2012; Pagiola, 2008b; Zúñiga, 2016). Environmentally friendly activities may include reforestation, sustainable logging, and conservation of natural forests. These projects currently protect over 250,000 hectares of forest.

Other countries, such as Mexico, with similar projects created in 2003, currently protect about 2 million hectares of forest, while China's PES projects protect over 14 million hectares (Pagiola, 2008a). These projects have also created positive perceptions about environmental protection. As highlighted by Dawson et al. (2018), reinforcing equity in these projects contributes to achieving success and instilling positive perceptions when considered in three interrelated dimensions (distribution, procedure and recognition). The distribution of PES addresses the question of who are the beneficiaries of PES; the procedure dimension responds to the questions of how decisions are made and by whom (Martin, Akol, & Gross-Camp, 2015); and the recognition aspect focuses on the sociocultural values and identities of the beneficiaries (De Jonge, 2011).

In recent years, policymakers and managers of ecosystems have gained more understanding about the importance of ES in enhancing the wellbeing of humankind and the role of community members in the management of ecosystems (Carpenter et al., 2009; Daily et al., 2009; Fisher et al., 2009). Policymakers also have acknowledged the importance of involving local

communities in sustainable management of ecosystems (Barrow & Murphree, 1998; Klee, Mordey, Phuare, & Russell, 2014). However, various studies have expressed the need for more research to explore the effective mechanisms to engage local communities in PA management while at the same time considering the social and economic wellbeing of those communities. This research explored factors that could contribute to make PES an effective tool in engaging local communities in conservation of the Gishwati-Mukura National Park (GMNP). The research questions were: What factors can enable a Payment for Ecosystem Services scheme to promote both tropical forest conservation and socio-economic wellbeing of communities located around a protected area? What factors encourage community members to be willing to engage in a PES scheme? The study took place in Rwanda, where PAs have been prone to human activities (e.g., agriculture and pasture land needs), which have caused a significant decrease in the size of PAs, as well as a loss of biodiversity. This study identified and explored the potential of PES to reconcile biodiversity conservation and socio-economic wellbeing of communities located within proximity of GMNP, a National Park in Rwanda gazetted in February 2016. This park has been used heavily by human beings living around it, with some engaging in illegal activities inside the park, including mining, agriculture, and cattle raising.

Methods

Study site

The research took place in four communities (known as cells and corresponding to the fourth level of administration in Rwanda) located within 5km of the GMNP: Gihira, Mubuga, Nyagahinika, and Rundoyi GMNP in the northwestern part of Rwanda (Figure 4-1), a central African country located south of the Equator, between 1o4’ and 2^{o}51’S and 28^{o}53’E. Rwanda is known as the country of a thousand hills, with an average altitude of 1700 meters. With its land

surface of 26,388 km^2, Rwanda hosts a population of roughly 11.92 million. About 91% of the population of Rwanda lives in rural areas. Poverty, high population density, and the scarcity of natural resources needed for a population of roughly 90% that heavily relies on subsistence agriculture are among the challenges that Rwanda faces (Musahara et al., 2010). Rwanda is ranked by the Business Insider as the 18th poorest country in the world, with a GDP per capita of $754.82 (Nyoni & Bonga, 2019). Despite efforts to protect its environment, and partly due to the high demand of natural resources caused by the population increase, Rwanda has experienced a decline in multiple ecosystem services that affects human wellbeing and threatens biodiversity in its PAs, including in Gishwati and Mukura forests (Stainback & Masozera, 2010).

The GMNP is comprised of two tropical montane forest remnants (Gishwati and Mukura) separated by 88 km which are occupied by human settlement and social infrastructure with large-scale cattle ranches, small-scale farming, and small patches of non-native tree plantations (Dawson & Martin, 2015). This research focused on the forest of Gishwati, which has elevation ranging from 2000 to 3000 meters above sea level, and sits in the Albertine Rift, a biodiversity hotspot (Plumptre, Masozera, & Vedder, 2001). The temperatures in Gishwati forest are generally cool, with the mean daily minimum and maximum temperature of 15^{o}C and 24^{o}C, respectively, while the mean annual rainfall is 1800mm (Chancellor, Langergraber, Ramirez, Rundus, & Vigilant, 2012; Nyandwi & Mukashema, 2011). The forest was classified as a natural reserve in 1930 and currently hosts about 58 species of trees and shrubs, including numerous indigenous hardwoods and bamboo. Gishwati forest is home to endangered primates, including the chimpanzee (*Pan troglodytes schweinfurthii*) and golden monkey (*Cercopithecus mitis kandti*) (Barakabuye et al., 2007). There are approximately 35 chimpanzees, 209 species of birds (with 20 species endemic to

the Albertine Rift and 10 on the IUCN Red List), and a number of amphibians and reptiles present in Gishwati forest (Kisioh, 2015).

Gishwati forest has been degraded and reduced from 28,000 hectares (size in 1970) to 886 hectares (size in 2008). The forest is bordered by four districts where the majority of households are known as smallholder subsistence farmers. According to Bush et al., (2010), the 2010 average annual household income in these farming communities was about US$540 while in Kigali, the capital and largest city, it was $620. Losses are relatively high compared to the average annual income due to human-wildlife conflicts in these communities. To remediate these conflicts, farmers practice active guarding to keep animals away from the farms (Shane et al., 2014).

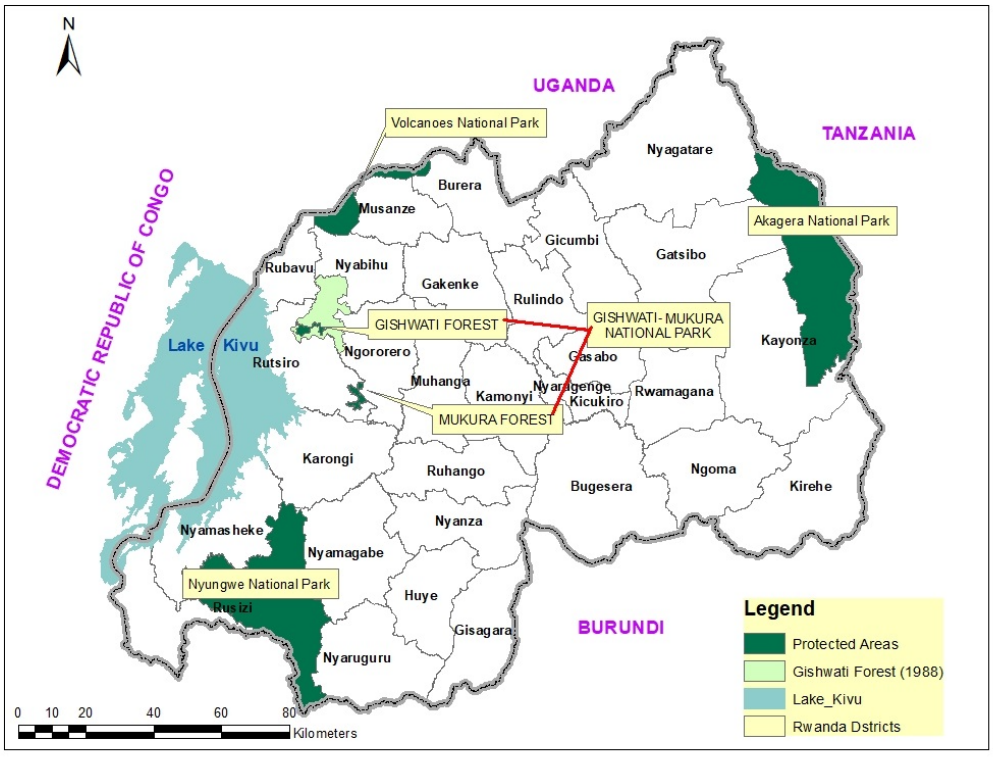

Figure 4- 1. Gishwati forest and Mukura forest which together comprise the Gishwati-Mukura National Park (GMNP), Rwanda. *Source: (image created by author).*

In 2014, the Landscape Approach to Forest Restoration and Conservation (LAFREC), a Global Environment Facility (GEF) funded project through the World Bank was established to rehabilitate GMNP while enhancing the sustainable land use. Under the management of the Rwanda Environment Management Authority (REMA), the main goal of this project was to rehabilitate the Gishwati- Mukura landscape. This five-year project planned to achieve its goal through biodiversity conservation and sustainable use of natural resources, increase in Gishwati forest cover, adaptation to climate change, and providing supports to the livelihoods of communities around GMNP (Musabyimana, 2014).

Study design

A mixed methods approach was employed to be able to provide a more complete understanding of the research problem and to increase the validity through triangulation (Creswell & Clark, 2011). This mixed methods approach followed a convergent parallel design, meaning both qualitative and quantitative data had equal value and were collected at roughly the same time. Both data strands were then merged for interpretation of the overall results (Creswell, 2013).

The convergent parallel design allowed me to collect and analyze two independent strands of quantitative and qualitative data at the same time and in a single phase. This design allowed investigation of convergence, divergence, contradictions, and relationships of the two sources of data during the interpretation phase and allowed for stronger data interpretation compared to other mixed or non-mixed method study designs (Creswell & Clark, 2017).

Sampling and participants

To ensure all the communities adjacent to the Gishwati forest were given equal opportunity to be selected for inclusion in this study, the communities around Gishwati forest were stratified into quadrants based on the cardinal points with 5km width from the forest edge. This distance was considered appropriate to capture the socio-economic effects or interactions between the forest

and the communities (Hartter, 2009). A community within each quadrant was selected randomly using the simple random selection method until four communities were identified for this research. Within each of the selected communities, households were selected for interview and survey using a geographically stratified random sampling technique. This technique uses ArcGIS to generate a set of random geographic coordinates, and those coordinates served as centers of the sampling study area to be known as a 'superpixel', a method that was developed by Hartter (2009). The superpixels that were within the forest were removed, because no households are located in the interior of the forest. In each of the four participating communities selected, ten superpixels were randomly selected and numbered 1-10 (Figure 4-2).

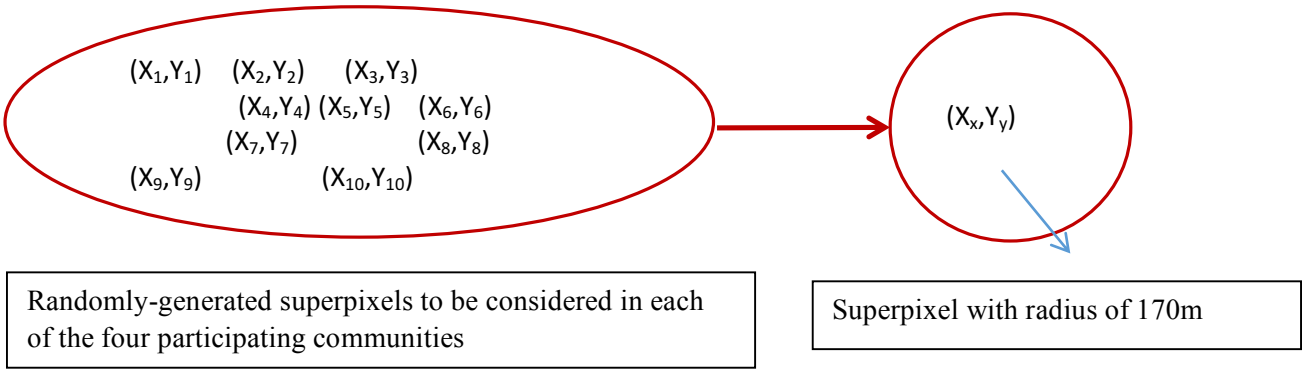

Figure 4- 2. Superpixel and household selection with XxYy representing a superpixel of 170m radius; within a superpixel, three households were randomly selected to participate in this research.

In each superpixel three households were selected randomly to participate in the study. Thirty households in each community constituted the households to be surveyed and interviewed and no selected household declined to be interviewed (Figure 4-3). While the focus was not to explore the use of resources from the PA by gender categories, to avoid bias in the results, both men and women were given equal opportunity to participate in the study. A list of 30 selected households was split in half and for one-half the head men of the households were surveyed and

interviewed, and for the other group, the head women of the households participated in the study. This allowed the study to capture a more comprehensive picture of resources used in each household because some work is culturally gendered, such as housework for women (e.g., gathering wood, getting water, cooking, handcraft production, and cleaning) and subsistence production for men (e.g., farming, animal husbandry, and timber harvesting).

With my two research assistants, we worked with cell executives (local leaders) and conservation volunteers from Forest of Hope Association (FHA) in each community to ensure the availability of the head man or the head woman of the household to be interviewed and respond to the survey. At the beginning of the interaction with each household representative, one interviewer explained the information on the consent form to each participant, with clarifications that the information collected would be used for academic purposes, with the promise to keep all information anonymous unless the participant decided otherwise. The survey and interviews were administrated in Kinyarwanda and took about one hour to be completed. Members of the research team were responsible for writing down the responses, as most of the participants did not know how to write. The same procedure was conducted at each of the participating households.

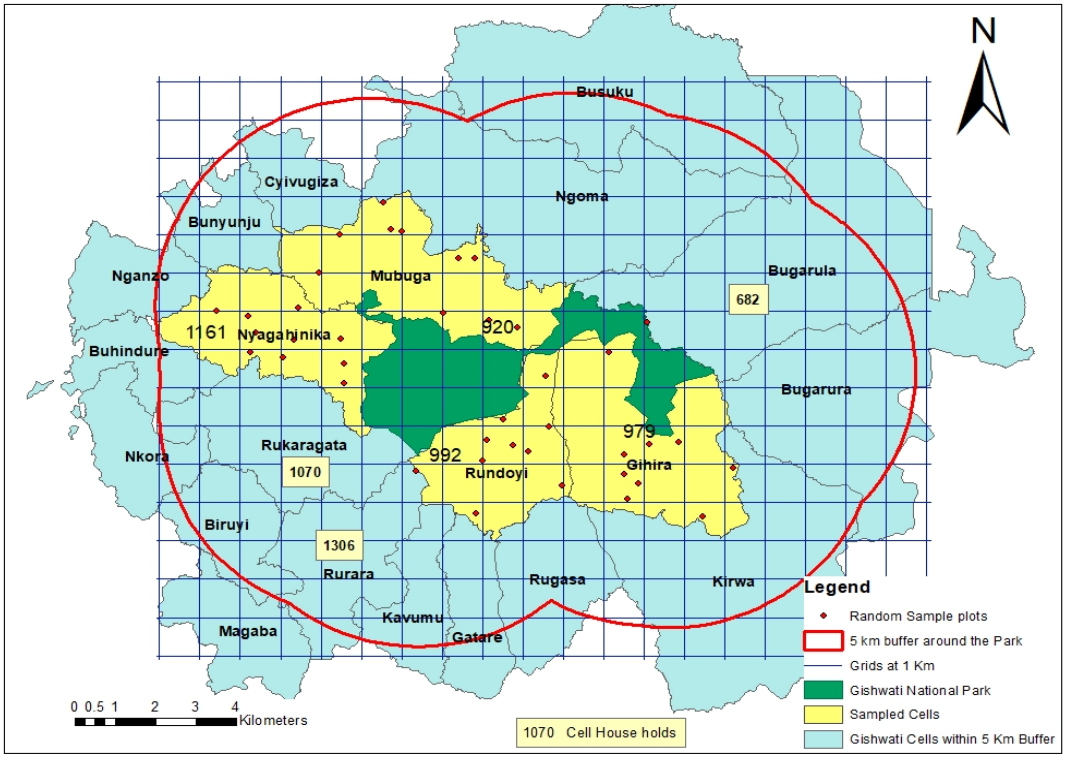

Figure 4- 3. Map showing all communities within 5km of Gishwati Forest with superpixels (in red) and number of households. Source: (image created by author).

Data collection and analysis

Data for this study were collected during two phases. The first phase lasted for three months in 2018, followed by one month in 2019 for the second phase when a follow up with participants was conducted to validate data. Before starting data collection, I selected two field assistants from the University of Rwanda based on their previous research experience, availability, and interests with the subject. I trained both field assistants for a week on the methods to be used. After the training, we spent time becoming familiar with the communities that were selected to participate in data collection. Some of the activities included: meeting with local leaders and with community volunteers who patrol the forest and train community members about the importance of the forest,

walking in the communities and around the forest to get a sense of the terrain, and meeting with FHA staff.

In each of the four communities, 30 households were surveyed and interviewed for a total of 120 households for this research. My research assistants and I did the survey, interviews, and focus group discussions in Kinyarwanda. At the beginning of the interaction with each household representative, we explained the information on the consent form to each participant, with clarifications that the information collected would be used for academic purposes, with the promise to keep all information anonymous unless the participant decided otherwise. The questions were asked in Kinyarwanda and took about 30 minutes to be completed. The same procedure was conducted at each of the participating households.

Household surveys. A survey was used to collect information related to livelihoods such as income, land ownership, land use, and crop production, as these are among the key criteria used in Rwanda to classify households into five socio-economic classes known as 'Ubudehe categories.' 'Ubudehe categories' are based on household living standards and economy and range from the poorest households (Category 1) to the richest households (Category 5).

Semi-structured interviews. Right after the survey was completed for each household, we proceeded with an interview. Questions during interviews explored factors that could enable PES to promote both socio-economic wellbeing and conservation. Interviews were conducted in Kinyarwanda language and took about 30 minutes. Only one person representing the household (who responded to the survey) was involved in the interview process. The semi-structured interview format allowed a deep understanding of the responses by permitting each participant to respond freely to the questions with minimum guidance (Appendix 2). This format made it easier to discuss topics that may be sensitive in nature and, on some occasions, follow-up questions were

improvised based on the conversation with the participant. Interview scheduling was limited to times when interviewees had enough time to be interviewed and were not rushing to carry out other activities. At the end of each day, I organized a debrief meeting with my research assistants to review how the data collection went and to prepare for the following day. I then transcribed the interviews in exactly the same words as were used originally and translated transcripts from Kinyarwanda into English, and a professional translator double-checked and confirmed my translation.

Focus group discussions. To validate the information from analyzed interview transcripts and surveys, information was supplemented with focus groups conducted during phase two of data collection (September of 2019). This allowed us to gather information to confirm the data and to catch discrepancies in responses. One focus group was conducted in each of the four participating communities and included four local cell executives (local leaders) from participating cells, four conservation volunteers who assisted with contacting participating households, about three randomly selected people who participated in interviews and surveys, and about three randomly selected members of the communities who were involved in this research for the first time. Focus groups were held at each cell's office, with the exception of one that was held at the FHA center. About 15 people (with equal representation of men and women between 30 and 65 years old) participated in each focus group, with about four hours allocated to each focus group discussion. I started the focus group discussions by asking participants to introduce themselves, then I explained what my research is about, which was followed by participants signing consent forms. I then broke participants into three groups of five people to continue discussions in small groups. The questions guiding the discussion were about the role of incentives (PES) in PA management and socio-economic wellbeing and factors that could contribute to a successful distribution of incentives. I

led one group, and my two research assistants each led one of the other two groups. All three groups then reconvened to present summaries from each group. My research assistants and I gathered and presented summaries from each of our respective groups to the rest of participants to make sure we correctly summarized ideas from each group.

Data analyses. Surveys, interviews and notes from focus groups were coded to allow synthesis of similar categories, resulting in seven major themes. These themes were then developed as the seven major enabling factors. Results from the qualitative and quantitative analysis were then compared and synthesized in order to inform the interpretation of the integrated results. Nvivo 11 software for Windows was used to analyze the qualitative data generated from interviews and focus groups sessions. The quantitative data were analyzed using Stata software for descriptive statistical analysis. The results were used to make meaningful interpretations of data about the socio-economic wellbeing of households and their perceptions about PES schemes.

Results

A total of 40 superpixels were sampled, and 120 households within those superpixels participated in the study, represented by both females and male participants. A large proportion of participants were poor and/or no formal education, with the majority of participants practicing subsistence farming on small farmlands (Table 4-1).

Table 4- 1. *Characteristics of the study participants from communities around GMNP, Rwanda*

Population characteristics	Total
Sample size (households)	120
Average household size	6
Average annual household income	251,853 Rwf (295 USD)
Average age	49
Male	50%
Female	50%
Illiterate	36%
Completed primary education	42%
Completed secondary education	19%
Higher education	2%
Farmers	68%
Farm size between 0 and 0.5 hectares	60%

Potential PES factors that may promote both tropical forest ecosystem conservation and socio-economic wellbeing of communities located around Gishwati-Mukura National Park

From data collected, seven enabling factors were identified as important for successful implementation of a PES scheme in poor rural communities settled around Gishwati forest. These include 1) improvement in livelihoods (associated with income, crop production, land ownership and land use), 2) nature of incentives, 3) community advocacy, 4) social cohesion, 5) governance structure, 6) socio-economic development opportunities, and 7) stakeholder engagement.

Factor 1: Livelihood improvement. The four studied communities are located within five kilometers of the PA, and their livelihoods heavily rely on various provisioning services from the park, including firewood, lumber for construction, wild fruits, medicinal plants, and bush meats. The majority of participants in this study mentioned that their livelihoods are mostly driven by income associated with land ownership, land use and crop production.

Income. The main source of income for the studied communities comes from farming activities with 51% of participants doing farming as the source of income. About 17% of participants have no job and have no income reported (Table 4-2). While some of the participants had more than one job, the source of income reported in the following table coincides with the job that brings more than 75% of income to the participant.

Table 4- 2. *Percentages of participants and primary reported source of income by studied communities around GMNP, Rwanda*

Cell name	Job type No job	Farming	Business owner (commerce)	Seasonal hourly labor	Fulltime salaried employee	Other (e.g., traditional healers, environmental volunteers)
Gihira	21.13	59.15	5.63	7.04	0	7.04
Mubuga	26.67	46.67	1.33	14.67	2.67	8
Nyagahinika	5.48	50.68	4.11	26.03	12.33	1.37
Rundoyi	16.67	51.52	1.52	9.09	12.12	9.09
Total	**17.54**	**51.93**	**3.16**	**14.39**	**6.67**	**6.32**

As shown in Table 4-3, the average income for a family of six is about 452,550 Rwf (530 USD) per year.

Table 4- 3. *Range in family income from 2014 to2019 around GMNP, Rwanda*

Cell name	Family income range per year (Rwf)
Mubuga	0 – 2,400,000
Gihira	0 – 2,500,000
Rundoyi	0 – 1,740,000
Nyagahinika	50,000 – 3,000,000

Variable	Obs	Mean	Std. Dev.	Min	Max
Income/Year	120	452,550	515,278	0	3,000,000

Crop production. Farming is the main source of income and a decline in crop production is one of the main reasons identified to drive some of the community members to harvest forest resources. For many respondents, the production of crops has decreased in the past five years due

to increase in heavy rains, soil erosion, the high cost of fertilizers and, recently, the restriction in the use of agricultural lands associated with the extension of park boundaries (Table 4-4).

Table 4- 4. *Communities and change in crop production between 2014 and 2019 around GMNP, Rwanda*

Cell name	% of Respondents with crop decreases	% of Respondents with crops remaining the same	% of Respondents with crop increases
Gihira	63.33	13.33	23.33
Mubuga	53.33	33.33	13.33
Nyagahinika	56.25	12.50	31.25
Rundoyi	73.33	20.00	6.67

Land ownership and land use change. While about 60% of participants own less than a half hectare, and the majority has seen crop production decline in the past five years, about 32% of the study respondents expressed concern related to a decrease in the value of land. This is mainly associated with the possibility of losing lands with the expansion of the park boundaries. There was no significant difference in the value of the land or in the amount people are willing to pay for the same land ($\chi 2 = 12.0000$, $p = 0.21$). The average value of the land per household was 4,077,500 Rwf (4,790USD) (SD 5,476,972), while the average amount a family is willing to pay to retain the land or to acquire the same size land in the same area is Rwf 1,592,083 (1,870USD) (SD 2,789,559) (Table 4-5).

Table 4- 5. *Land value and amount of money participants are willing to pay to keep the same land they currently own around GMNP, Rwanda*

Cell name	Range in value of land per household (Rwf)			Range in amount a household is willing to pay to retain or acquire the land (Rwf)	
Gihira	0 (0 Ha) –19,000,000 (3 Ha)			0 (0 Ha) –10,000,000 (3 Ha)	
Mubuga	0 (0 Ha) –15,000,000 (3 Ha)			0 (0 Ha) – 7,500,000 (3 Ha)	
Nyagahinika	0 (0 Ha) –14,000,000 (3 Ha)			0 (0 Ha) – 3,000,000 (3 Ha)	
Rundoyi	0 (0 Ha) –33,000,000 (3 Ha)			0 (0 Ha) – 20,000,000 (3 Ha)	
Variable	Obs	Mean	Std. Dev.	Min	Max
Value of the land	120	4,077,500	5,476,972	0	33,000,000
Willing to pay for the land	120	1,592,083	2,789,559	0	20,000,000

According to participants whose lands are near the forest, the extension of the boundaries of the PA has affected farming, which is the major source of income for the studied communities. Some community members have been restricted in the use of their lands and have been allowed to plant only trees or tea, as these could serve as buffer zones. This recent land use change has, in addition, affected the perceptions of communities with regard to the importance of having a PA in their neighborhood. As mentioned by one of the respondents:

> I don't see any benefits from having this park, as it is here to take away our lands or to direct us what to plant in our lands that is not necessary what we need to survive. I wish those in charge of this PA would spend time in our villages to understand our needs, instead of making decisions for us without our participation. I have been asked to plant trees in a one-ha of land, where I used to plant sweet potatoes and beans. You know trees will take a long time to grow. So, what will I be feeding my family?
> (Interview with participant #45)

While the Landscape Approach to Forest Restoration and Conservation (LAFREC) Project has made some compensations to those affected by the extension of park boundaries, the majority of those affected by the expansion of Gishwati forest expressed dissatisfaction with the

compensation as well as the project implementation in general as shown in Table 4-6 and expressed by participant #107.

Table 4- 6. *Percentages of participants restricted in the use of their lands and compensation implementation satisfaction around GMNP, Rwanda*

Restricted in the use of land due to the extension of the park boundaries	Received compensation at the time of the study	Have not received compensation at the time of the study	Expressed dissatisfaction with the compensation received	Total percentage affected by LAFREC project and expressed dissatisfaction in general
19.17% of total of the studied population	42.7	57.3	89.9	98.7

> Because of this forest, I lost the freedom to use a good size of my land, and I was told I will be compensated for the restriction in land use that was imposed to me. It has been more than a year, and I have received nothing as of today. The small part of land that is left, I had planted various crops, and the chimpanzees have destroyed all my crops. I have no one to advocate for me, and I can't afford to go to Kigali to make a claim myself. So, my son, do you really think I should care about protecting this forest? Protecting it for whom? If those in charge of this forest cannot assist me while I am struggling to feed my family, do you think I should care much of them asking me to not harm those animals when they are destroying my crops?
>
> (Interview with participant #107)

Because the protection of the forest has been reinforced and those with lands near the forest have been asked to abide by the strict protection of the forest, some of the participants expressed the fear to hunt or kill animals when these animals (especially chimpanzees) come to destroy crops. The majority of participants have faced crop-raiding in the last five years, some have been restricted in the use of their lands (they may use their land only for wood lots or tea plantations), while only four reported no challenges associated with having their lands within proximity of the protected area (Table 4-7).

Table 4- 7. *Crop-production near the forest and conflicts associated with the GMNP, Rwanda*

Cell name	# of Respondents who reported no negative effect associated with having their lands adjacent to the forest	# of Respondents who reported crop loss due to wildlife crop-raiding	# of Respondents who reported restriction in land use due to extension of the protected area boundaries
Gihira	1	25	4
Mubuga	3	24	3
Nyagahinika	0	30	0
Rundoyi	0	30	4
Total	**4**	**105**	**11**

Factor 2: Incentives to participate in PA management. Participants expressed the need for cash payments as incentives to motivate them to participate in PA management. As expressed by the majority of participants, incentives are needed to reduce the burden caused by crop raiding and land use restriction due to the extension of the PA. Payments would also reduce their dependence on the forest resources. In all communities that participated in this study, the majority of participants responded that, among the payment options that were suggested in this study as incentives to engage in the protection of the forest, the category of Rwf 50,000+ would make a significant difference in their livelihoods and would reduce their dependence on resources from the PA. A small percentage expressed less interest in payments and would prefer to be moved away from the forest, while a considerable percentage of participants have no choice in terms of how much to be paid and would leave the decision to be made by the government (Table 4-8).

Table 4- 8. *Participants' choices for monetary payments as incentive to participate in conservation around GMNP, Rwanda*

	Payment categories (Rwf) and percentages of respondents (n= 120)					
Cell name	No payment but land in exchange	5,000-10,000	10,001-20,000	20,001-50,000	50,001+	Government to decide the amount
Gihira	3.33	3.33	3.33	10.00	63.33	16.67
Mubuga	3.33	0.00	10.00	6.67	50.00	30.00
Nyagahinika	3.12	0.00	3.12	9.38	65.62	18.75
Rundoyi	16.67	3.33	0.00	6.67	56.67	16.67
Total	**6.56**	**1.64**	**4.10**	**8.20**	**59.02**	**20.49**

When asked how often and for how long such payments should be received, the majority of participants preferred a monthly payment, while others would prefer a one-time payment. Those who expressed no interest in payments insisted on receiving lands away from the forest, while others prefer to leave the decision to be made by the government (Table 4-9).

Table 4- 9. *Respondent preferences for frequency of payment as incentive to engage in protecting the GMNP, Rwanda*

Cell name	Monthly (%)	Twice a year (%)	One installment (%)	Government to decide how often to pay (%)
Gihira	88.12	4.35	7.53	0.00
Mubuga	51.5	10.65	17.67	20.18
Nyagahinika	56.22	7.3	26.1	9.38
Rundoyi	67.67	0.00	19.69	12.64
Total	**66.13**	**5.57**	**17.75**	**10.55**

The majority of those who expressed interest in monthly payments mentioned that they would like to receive payments for as long as they will be engaged in activities that benefit the park and the environment in general (Table 4-10).

Table 4- 10. *Respondent preferences for long term payment options as an incentive for community members to engage in protecting the GMNP, Rwanda*

Cell name	One installment (%)	Over one year (%)	More than one year (%)	Lifetime (%)	Government to decide the amount (%)
Gihira	10.67	7.25	10.67	67.25	4.16
Mubuga	23.67	4.45	0.00	67.32	4.56
Nyagahinika	25.35	3.7	3.25	52.45	15.25
Rundoyi	16.67	0.00	3.33	63.33	16.67
Total	**19.09**	**3.85**	**4.31**	**62.58**	**10.16**

When asked who should receive payments, about one-third of respondents said those whose lands are near the park and were affected by the park establishment should receive payments, and about one third responded that all poor people should receive payments (Table 4-11).

Table 4- 11. *Category of people who should receive a PES, if they are involved in activities that benefit the GMNP, Rwanda*

Cell name	No one (%)	Those near the forest (%)	Those affected by the forest (%)	Poor people, regardless of proximity to the park boundary (%)	Every household in the community (%)	Those whose work benefits the park (%)	Unsure (%)
Gihira	3.33	40.00	33.33	16.67	0.00	6.67	0.00
Mubuga	0.00	0.00	43.33	50.00	0.00	0.00	6.67
Nyagahinika	3.12	21.88	18.75	25.00	31.25	0.00	0.00
Rundoyi	3.33	13.33	40.00	36.67	3.33	3.33	0.00
Total	**2.46**	**18.85**	**33.61**	**31.97**	**9.02**	**2.46**	**1.64**

Those who showed no interest in any level of payment and those who were unsure of who should receive payments, expressed the need to use PES to relocate people whose lands are close to the PA to locations where they will have fewer conflicts with the PA. They also expressed that

funds should be invested to cover the costs associated with advocating for those who are affected by the park (e.g., transportation, communications, meetings and training costs).

Factor 3: Community advocacy. The majority of participants expressed the need to have representatives other than their local leaders who can assist with channeling their concerns to those in charge of resolving peoples' problems at the country level and who can work closely with both local leaders and country leaders to find solutions to the challenges facing communities around the GMNP. Some of the participants also mentioned the need for assistance with reporting and following up on claims related to crop raiding as the claiming process involves expertise in documenting damages (e.g., writing a claim, taking pictures of the damages, and filing a claim), time, and other resources that some people may not have (Table 4-12).

Table 4- 12. *Participants' need for community advocacy and support in making claims associated with crop raiding around GMNP, Rwanda*

Cell Name	# of participants who expressed no need for community advocacy	# of participants who expressed the need for community advocacy	# of Respondents with no assistance needed with claims	# of Respondents needing assistance with claims
Gihira	4	26	13	17
Mubuga	5	25	11	19
Nyagahinika	2	28	18	12
Rundoyi	3	27	14	16
Total	**14**	**106**	**56**	**64**

As highlighted by one of the respondents, community conservation volunteers managed by FHA play an important role in advocating for the community and in assisting PA managers to motivate members of the community to engage in activities that benefit biodiversity conservation and environment in general.

> Expressing your concerns and frustrations caused by the forest to someone who lives with you and who shares the same struggles with you is different from telling your problems to someone who doesn't live here and who has no clue what your struggles are. We hear that

> we have visitors in charge of the park and we should join to express our problems but, seriously, those people who come to us from Kigali and spend one hour with us—what do you think they will learn in that short time? Moreover, what kind of advocacy will they offer to us if they do not know our struggles? At least, these volunteers from the FHA live daily here with us, and they face the same challenges we face. I personally feel comfortable talking to them, and I would listen to them more than those tourists from Kigali.
> (Interview with participant #16)

Factor 4: Social cohesion. Results show that those who have been in the community more than 25 years are more engaged in meetings and activities related to the park that affect local people. Their perceptions about the PA and its management influence the perceptions of those who have been in the community for shorter periods. Social cohesion could play a major role in a successful implementation of a PES scheme or any other project related to the PA. Statements by participants below illustrate this issue.

> I do not get to say much in the meetings. My neighbor has been here for a while and knows well our local leader and the managers of the park. He knows what we are going through, and I let him talk on my behalf.
> (Interview with participant #27)

> I have not been here for long (less than 10 years), and I do not go to the cell meetings. I know from my neighbors, who have been here for a while and know so much about the park, that the PA management has changed for the worse. I trust them, because they have lands near the forest and are restricted in the use of them since the forest became more protected.
> (Interview with participant #51)

> I moved here from Karongi six years ago and, last year, I joined the community volunteers, because my friend asked me to join. As a mother of five children, I felt I did not have time to be a volunteer. However, my friend convinced my husband that it would be good to get involved with FHA. My husband and I respect him, and I said I would try it for a little bit and see how it works. So far, it is going well, especially because I have made new friends, and we get to educate others about the importance of the park.
> (Interview with participant #6)

Those who have been longer in the community have commented on their interaction with new members of the community and how new people look up to them for guidance.

> I have seen a lot, my son! I used to go to the meetings and talk with our leaders about the management of the forest and how chimpanzees are a problem for many of us who have lands near the forest. I am now unable to attend meetings because of my illness. However, neighbors still come to ask me what my opinions are about the new local leaders and the management of the park. Many neighbors have come to me to ask what they should do to fight for the lands they lost because of the park. I wish I were still able to go to the meetings and ask to be compensated for my land that they took away… I want to talk to the higher-up leaders, because things have to change with the way our complaints are being handled. Our local meetings are just to inform us, and we cannot really get an answer about our complaints.
> (Interview with participant #88)

Factor 5: Governance structure. Some participants in this study voiced their concerns about the governance structure having a top-down approach. About 75% stated that they feel they have had no opportunity to engage in the decision-making process related to activities and policies that affect their lives and the community in general. As an example, with the recent process of expanding the park boundaries, the perception of the majority of participants is that there were not given a chance to have a say over how they use their lands. While they acknowledge the importance of having local leaders representing them, their perception is that there is a need to be informed about projects in the area that will affect them, and they want to be more engaged in making decisions and implementing development projects in their communities. The majority of participants indicated they were not given a chance to be involved in decision-making (Table 4-13).

Table 4- 13. *Participants' responses to whether or not they were given an opportunity to engage in decision-making for the management of the GMNP, Rwanda*

Cell name	Do you think you were given a chance to have a say in decision-making over the projects and policies that affect you (e.g. use of the resources from the forest, extension of park boundaries)?	
	No (%)	Yes (%)
Gihira	63.33	36.67
Mubuga	80.00	20.00
Nyagahinika	84.38	15.62
Rundoyi	73.33	26.67
Total	**75.41**	**24.59**

The lack of community engagement in decision-making was attributed mainly to the qualities of leaders and park managers. Participants identified some of the qualities of a good leader they wish to see their local leaders have in order to succeed with projects that involve people and money (Table 4-14).

Table 4- 14. *Preferred qualities of a leader identified during the survey and complemented during the focus group (with no ranking value attached) that participants wish their local leaders to have*

Quality	Source
Good listener	Survey and Focus Group
Good communicator	Focus Group
Active	Focus Group
Patient	Survey
Self-confident	Focus Group
Culturally sensitive	Survey and Focus Group
Transparent and honest	Survey and Focus Group
Accountable	Survey and Focus Group
Humble	Focus Group
Creative and innovative	Focus Group
Mediator	Survey
Sociable	Survey and Focus Group
Educated	Survey and Focus Group
Not corrupted	Survey and Focus Group
Family oriented and with family values	Focus Group
A problem-solver	Survey and Focus Group
Good manners (especially a leader who will not engage in destroying others' marriages)	Survey and Focus Group

Factor 6: Socio-economic development opportunities. During interviews and focus groups, several initiatives were identified as important for the communities around GMNP. About 94% of participants expressed their likelihood to engage in activities that benefit the PA if projects and initiatives that benefit their wellbeing were implemented (Table 4-15).

Table 4- 15. *Initiatives that could be supported through a PES scheme as suggested by participants*

Initiatives	Source
Provide free formal education for all students.	Survey and Focus Groups
Provide or create jobs for local people.	Interviews and Focus Groups
Provide land away from the PA to relocate those who own land near the PA.	Interviews
Fence the park to keep the animals from the crops.	Interviews and Focus Groups
Provide improved animal breeds and seeds for agriculture.	Focus groups
Revamp and make easy the process of claiming and being paid for crop raiding.	Interviews and Focus Groups
Invest in infrastructures, such as roads, that will increase the trade of goods and services with other communities.	Interviews and Focus Groups
Innovate income-generation projects, such as ecotourism, beekeeping, and arts and crafts.	Focus Groups
Make available and easy to access small grants and micro-loans.	Interviews and Focus Groups
Revamp the existing cheese factory to become a hub for milk collection and cheese making in the area	Interviews and Focus Groups
Create sustainable associations that can access start-up loans and guidance.	Focus Groups

Engaging multiple stakeholders at local, national, and international levels to ensure the successful implementations of the above-mentioned initiatives was a subject of discussion during interviews and focus groups.

Factor 7: Engaging stakeholders in a PES scheme. The lack of strong leadership in bringing together local people to discuss issues related to the park has left some of the community members questioning the worth of attending meetings, because they are informed of decisions already made and are not given a voice to express their concerns and their ideas about how to improve their wellbeing after designation of the PA. Participants in the study expressed the need for local leaders and some local influential people to increase the level of engagement with local community members in discussions and decision-making over activities and policies that affect

their wellbeing. They suggested forming a group to spearhead a collaboration among the residents and institutions at both national and international levels. This group would be tasked with 1) recruiting concerned stakeholders, 2) assessing the needs of the local communities, 3) identifying and setting tangible and achievable goals and objectives, and 4) looking for funding opportunities and other income-generation possibilities for a PES scheme. Participants in the focus groups expressed the importance of engaging all relevant stakeholders in the early stage of planning. Some of the benefits of the early engagement highlighted during the focus group discussions include building relationships, increasing trust and transparency, finding common grounds, and providing time to adjust practices and processes along the way.

According to the participants in the focus groups, those who are directly impacted by the PA including local leaders, representatives of various groups in the areas such as faith groups, tourist businesses, women associations, large-scale farmers, environmental clubs (if any), and schools, should be represented among the stakeholders that will spearhead the conversation and the collaboration. Participants in the focus groups identified some of the steps to consider when designing a PES scheme including: 1) nomination of a representative from each of the participating groups to champion the initiative, 2) building trust among the PES promotors and the community, 3) creating a roadmap to achieve the goals and objectives of the group, 4) incentivizing goals based on the availability of funding and resources, and 5) putting in place mechanisms to manage efficiently PES funds.

Discussion

Environmental markets such as PES are being used as incentives to engage people in ecosystem protection, including ecosystems that host endemic and endangered species threatened by humans (Loft, Gehrig, Le, & Rommel, 2019; Pattanayak, Wunder, & Ferraro, 2010). However, many of these schemes have failed to deliver due to various enabling factors that are often left out or ignored by those who design and implement these schemes (McShane & Wells, 2004; Sandker et al., 2009). As identified in this study, enabling factors are important to ensure the success of PES schemes around PAs, especially in developing countries where local people heavily depend on resources from PAs. Poor communities around PAs are often reluctant to engage in community-based conservation (Dharmawan, Böcher, & Krott, 2016; Sanderson & Redford, 2004; Zilberman, Lipper, & McCarthy, 2008), and this reluctance is often linked with the lack of resources to meet the socio-economic wellbeing of communities. This fact is borne out in this study of GMNP, where the use of resources from this relatively new PA has been restricted to benefit biodiversity conservation. As results show, this restriction has impacted the ability of households to secure resources to meet their basic livelihoods and to generate income that can support other aspects of socio-economic wellbeing, such as social cohesions, education, and food security.

Livelihoods improvement

Ecosystems provide services that are important for the livelihoods of people in general and specifically for those who directly rely on natural resources for their survival. While land scarcity and land based conflicts remain constraints to many developing nations, the majority of people directly rely on farming for their livelihoods (Aguilar-Støen, Taylor, & Castellanos, 2016; Cornia, 1985). Such is the case for Rwanda where the national average land-size per household is less than 0.7 ha. (Dawson & Martin, 2015; Musahara & Huggins, 2005). Not only is the shortage of land a

challenge to communities around PAs (studied communities with 0.5 ha of land per household), but also crop production is often affected by weather related events, crop raiding, and inaccessibility of fertilizers (Agyeman, Yeboah, & Ashie, 2019; Chen, Zhang, Peterson, & Song, 2019; Nishimoto, 2019). These challenges are heavy burdens to households to secure income needed to meet the basic needs of life such as food, shelter, healthcare, education, and social connections (Chaigneau, Coulthard, Brown, Daw, & Schulte-Herbrüggen, 2019; Fisher et al., 2013). Where such burdens are not alleviated, the use of natural resources from PAs have been inevitable, making effective management of PAs hard to achieve. Any PES scheme targeting biodiversity conservation must recognize that people' livelihoods around PAs are inextricably linked to the ecological integrity of the PAs and vice versa (Davis & Goldman, 2019).

While the majority of people's livelihoods in rural areas and around PAs are based on farming activities that are negatively affected by wildlife, making income less available, and land based activities less attractive, the need for alternative non-farm based income such as PES incentives have potential to help households improve their socio-economic wellbeing (Nagler & Naudé, 2017; Reardon, Taylor, Stamoulis, Lanjouw, & Balisacan, 2000; Sackey, 2018). Those planning and implementing a PES scheme for communities should consider people's livelihoods that are linked to income and influenced by land ownership, land use, and crop production. Understanding the livelihoods of people requires good communication, building trust and working closely with local community members (Brownson et al., 2019; Davis & Goldman, 2019).

Active participation of local communities

Engaging local communities in the design and implementation of a PES scheme is one of the contributing factors to a successful scheme (Allen & Colson, 2019; Davis & Goldman, 2019). Local community members are well positioned to provide helpful insights that could be used in

ensuring the scheme will meet the needs of the people in the community. As in this study, participants were able to come to a consensus about categories of potential beneficiaries of PES incentives if any were to be disbursed in the community. Those directly affected by the park were identified as the most eligible for incentives followed by poor people in the communities regardless of the impact of the park. As Pagiola, Landell-Mills, & Bishop (2002) mentioned, a PES scheme target landowners (who are often poor) with aim of motivating them to protect ES on their lands and to encourage them to participate in activities that benefit biodiversity conservation. Acquiring such insights from poor people in the community and those marginalized local members has been associated with fostering positive perceptions about environmental protection and has contributed in gaining support from local communities towards projects that benefit biodiversity conservation (Baral & Heinen, 2007; Bennett & Dearden, 2014; Lliso, Pascual, Engel, & Mariel, 2020).

There is a level of participation and conversation needed to gain a buy-in from these communities and to ensure their support (Calfucura, 2018; Schick et al., 2018). A PES scheme that does not engage local communities in various stages of a project's development and implementation often fails because of lack of motivation from some of the stakeholders (Barnaud et al., 2018; Paudyal, Baral, & Keenan, 2018). While the LAFREC project that aimed at landscape restoration, climate resiliency and livelihood improvement in the Gishwati-Mukura Landscape does not include PES as part of its activities, frustrations and resentments highlighted by various participants (e.g. participants #45, #88, and #107) show how an environmental protection project that doesn't efficiently engage local people can create tensions between those who plan and implement a biodiversity conservation project and the communities that are affected by the project.

Environmental projects that fail to engage local communities not only usually fail to deliver (Ancrenaz, Dabek, & O'Neil, 2007; Sterling et al., 2017), but also often create misunderstandings

among community members due to issues of fairness and equitable distribution of benefits, such as payments (Sommerville, Jones, Rahajaharison, & Milner-Gulland, 2010). As explored by Gross-Camp, Martin, McGuire, Kebede, & Munyarukaza (2012), if not well managed, PES schemes can create conflicts between PA management and local communities. As highlighted by participants during the focus groups, taking into consideration the equitable and fair distribution of benefits is important to achieve a successful PES scheme and other community-based projects. Such consideration could benefit environmental projects such as the LAFREC project, where some people benefitted from the project, and others have not yet received the compensations (e.g., Participants #88 and #107). Such perceptions have an effect on the potential role PES could play in the area, as environmental projects that do seek to support the livelihoods of people from communities around PAs are starting off with a negative perception among community members (da Motta & Ortiz, 2018; Stern, 2008).

Nature of incentive

Engaging local communities in a PES scheme and in biodiversity conservation comes with a cost in terms of economic incentives to revive the community vitality and reduce frustration from those who are often poor or marginalized and are unable to freely harvest natural resources from PAs (Butsic, Baumann, Shortland, Walker, & Kuemmerle, 2015; Kovács et al., 2015; Soliku & Schraml, 2018). Limiting the use of resources from PAs and expanding the PAs at the cost of local community members can be the source of conflicts between the management of the PAs and local community members. As an example, because those who are subject to land use restriction as a result of the extension of the park boundaries were not involved in making decisions about the expansion of the PA and the compensations for their loss of freedom in land use, the majority of local community members that participated in this study expressed resentment and frustrations

towards the management of the PA. Moreover, frustrations were aggravated by the value of in-kind payments they received that were not worth the loss of freedom in the use of their lands for the park's benefit. While the majority wishes to have been involved in the negotiations of the compensations, they affirmed that if they had received direct or indirect payments that were attractive to them and that were going to allow them to meet their livelihood needs, they would have been onboard with the project. As Arriagada, Villaseñor, Rubiano, Cotacachi, & Morrison (2018) mentioned, incentives to communities should be attractive enough and significant to cover the cost associated with meeting the basic needs of life.

As an example, participants in this study related that monetary payments could be extended to poor people and those who lost their land and crop production due to crop raiding and the extension of the boundaries of the park, and that such payments would reduce their dependence on park resources. The majority of participants preferred that the maximum amount of payments that could be made (in this case was Rwf 50,000 and above) be allocated to those affected by the park and the poor people once a month to assist them with management of incentives. Such an amount is nearly the average income in rural areas in Rwanda (Rwf 69, 251) (NISR, 2015).

Community advocacy

Providing direct and indirect payments is not all that is needed for a successful PES scheme. As in many cases, beneficiaries of projects related to PA management (e.g. PES scheme or ecotourism) are often poor or marginalized with limited resources and education to deal with various processes related to PA management and community development (e.g. opening accounts if needed for direct payments or filing a claim), and thus community advocacy is important to ensure beneficiaries have assistance needed to fully engage in the project (Bello, Lovelock, & Carr, 2017; Tarimo & Mgumia, 2018). This is the case for some participants in this study who are poor,

affected by the land use restriction, and have not received any compensation for their loss of freedom in using their lands for agricultural practices. Community advocacy could prevent those problems in the future. However, precautions should be made to ensure a community advocacy team is not dominated by elites, who are often educated, vocal, and wealthier community members, as they may hijack the conversation for their own benefits (Bello et al., 2017; Marzuki, Hay, & James, 2012). While there could be apathy from local community members to engage in PES schemes or other environmental-related projects, a group of advocacy made by people of integrity (elders, leaders, and other trustworthy community members) is likely to succeed with motivating local community members to participate in the project (Hall, 2008).

Engaging local representatives in ensuring the implementation of all equity dimensions (distribution, procedure and recognition) allows local communities to become more engaged in the decision-making process because they trust more their local representatives who advocate for them (Arriagada et al., 2018; Schultz & Kaiser, 2012). Local advocates could play an important role in identifying and engaging key stakeholders and could help in building trust where people feel comfortable sharing their views and concerns (Davis & Goldman, 2019; Stern, 2008). Local volunteers from the FHA have initiated such advocacy, however with limited to no resources dedicated to such endeavor, the impacts from the advocacy are limited.

Social cohesion

As some participants mentioned (e.g., participants #6, #27, and #51), the influence of those who have lived locally for longer periods in the community is an important factor that helps strengthen community social cohesion and shape perceptions and attitudes towards PA management. Some members of the studied communities who have lived in the community for less than ten years (“the new comers”) look up to those who have settled in the area longer before

(more than ten years) for guidance, representation, and advice. While the "new comers" settled in the area years after the 1994 genocide against Tutsi, they present the same characteristics (e.g., same language and are mainly farmers) as those who have lived in the area for many generations. Presenting the same characteristics and having those who lived longer in the community be willing to provide advice and share their knowledge with the "new comers" enabled both groups to work as a community, allowing trust and mutual respect to evolve, hence, social connection forming.

As Desjardins, Halseth, Leblanc, & Ryser (2002) mentioned, stronger bonds (in this study shown by trust, seeking for advices from elders and respected people in the community) allow people to follow community norms, work together to respond to various challenges that the community may be facing, and increase participation in community projects. Enabling more social cohesion by using existing infrastructures such as weekly community gatherings and monthly community work known as "umuganda" can contribute to more transparency and accountability if guided by fairness, equity, and inclusion of poor and marginalized people in the community. Local government, and other interested entities can tap into these opportunities and convene decision-makers to allow fruitful discussions about projects that can benefit both PA management and socioeconomic wellbeing of local communities. Such collaboration can contribute to members of a local community having positive perceptions about a PA and its management.

Governance structure

While PA boundaries extension is justified by the need for biodiversity conservation, the restriction in the use of land adjacent to the PA has negatively affected the perceptions of communities about the importance of biodiversity conservation and the GMNP management approach. Community members in this study stated they were not invited to provide their input into the park management decisions. As expressed in some interviews, some people wondered why

concerned local people would be left out of the decision-making process when the new park was created which was going to affect their livelihood. Members of these local communities resent being told what they may do with their lands that are within the demarcation of the new boundaries of the PA. Projects such as LAFREC that benefit PAs may have in their project design the engagement of local people and may report some level of engagement. However, poor implementation of the plan may lead to local people having perception of being left out of the decision-making process, which could lead to mistrust and resentment from local people towards the managers of the projects.

The success of a PES scheme lies in the hands of both those benefiting from it and those implementing it. Honest conversation among all stakeholders involved, especially from the leaders of the scheme (as highlighted during interviews and focus groups), plays an integral part in achieving any project's goals and objectives. As voiced during this study, frustration over perceptions of mismanagement and inequitable benefit distribution among those affected by the extension of the new park's boundaries could create resentment towards the park and projects designed to help protect it. Respondents highlighted the importance of quality leadership to understand the social equity and the need to manage transparently and equitably the benefits from any PES scheme that could contribute in achieving both socio-economic wellbeing and PA management effectiveness. As shown in this study and also mentioned by Goleman, Boyatzis, & McKee (2013), Gujral (2012), and Maxwell (2019) various leadership qualities are important for effective and good governance. Participants in this study mentioned that if their local leaders had those qualities, there would be fewer conflicts between leaders and community members and more local people will be engaged in meetings, projects, and other activities organized by local leaders.

Socio-economic development opportunities

Leaders with good qualities engage local people they represent in identifying and pursuing socio-economic development opportunities (Goleman et al., 2013). Participants in this study noted that local people know what opportunities could improve their wellbeing and what projects they would like to see implemented in the community. When both leaders and local community members share interest in these opportunities, the chance for greater success can be expected. Economic development opportunities identified in this study require monetary investment that could surpass the means of local communities. However, often PAs have some form of revenue-sharing schemes to offset the costs associated with living in the proximities of a PA (e.g. crop raiding, restriction in use of resources from PA) (Spenceley, Snyman, & Rylance, 2019). With the government of Rwanda investing in revenue-sharing schemes in communities around PAs (Nielsen & Spenceley, 2011) and Gishwati-Mukura being a PA, some of the economic development projects suggested by participants may see light. Through revenue generated from tourism, the government may fund infrastructures such as roads and clean water, both government and private sectors may create jobs, and ecotourism may be a source of income generation for the community. As Rylance & Spenceley (2017) mentioned, the level of commitment to revenue sharing is directly correlated to the availability of funds and the political will which informs projects that may be prioritized for implementation. Revenue sharing under a PES scheme will require, then, funds and support from the government and other stakeholders.

Stakeholder engagement in a PES scheme

Identifying stakeholders and engaging them in the process to develop a PES scheme is not an easy task to accomplish (Thompson, 2018). A group composed of local leaders is easy to identify and engage if the central government is on board with a PES scheme and requests that local leaders engage in such a project (Sterling et al., 2017). Private-sector groups from the

proximities of the ecosystems targeted for a PES scheme could be the hardest to convince to take part in the scheme (Young et al., 2013). While local stakeholders are an integral part of a PES scheme, stakeholders from the central government and other decision-making institutions are important for the scheme, yet often difficult to engage, as they are not directly impacted—nor do they often directly benefit—from the ecosystem targeted for the PES scheme (Engen, Fauchald, & Hausner, 2019; Reed, 2008). As highlighted by various participants in this study, both local and non-local stakeholders are needed to ensure the success of a PES scheme.

However, an effort should be made to engage at least one champion from each government institution and organization working in the environment sector, as well as good representation from local community members as all members of the community may not be able to participate. Additionally, the remainder of the community should be informed of the progress of the scheme, and their ideas and concerns should be brought to the attention of the PES stakeholders. Some precautions should be taken as the lack of leadership skills and collaboration structures may hinder stakeholders' participation in the planning process (Hatipoglu, Alvarez, & Ertuna, 2016). Furthermore, the lack of a shared vision and interest, as well as an unclear long-term plan, could negatively affect the engagement of stakeholder in the planning process (Ladkin & Bertramini, 2002). While most of the participants in this study acknowledged the importance of stakeholder participation and the steps that could be taken for active engagement, participants noted how challenging such stakeholder engagement could become if the task to identify and engage stakeholders was left in the hands of local communities.

Conclusion

This paper identified seven factors that could enable a PES scheme to achieve effectiveness in PA management while improving the socio-economic wellbeing of communities located within proximity of a PA and of the residents who rely directly on natural resources from the PA. This study identified seven enabling factors—including the improvement of community livelihoods, type of incentives, community advocacy, social cohesion, country/local governance structures, and stakeholder engagement—that are important to guide development of PES schemes for PA management.

Overall, this study found that coupling consideration of various enabling factors with effective engagement of stakeholders (local and national) could allow communities within proximity of a PA to have positive perceptions about biodiversity conservation. It also could assist communities to reap socio-economic benefits associated with being involved actively in conservation projects that contribute, at the same time, to achieving effectiveness in PA management. The willingness to engage in these projects should be identified, and clear expectations should be communicated to all stakeholders, to champion the idea and motivate others to engage in the PES scheme. Creating clear expectations and keeping local community members informed about the PES scheme could help to avoid rumors and circulation of false information that contribute to negative perceptions from the communities about biodiversity conservation projects and PA in general.

The contribution of this part of the dissertation is two-fold: scholarly and practical PES contributions. The scholarly contribution is the understanding of the potential role of the PES approach in socio-economic development of local communities and PA management in the context

of developing countries. Previous studies have explored PES at a macro level, and there is a need for similar studies at the micro (community) level (Hejnowicz, Raffaelli, Rudd, & White, 2014; Wunder, Engel, & Pagiola, 2008). There is also need for larger-scale research (multiple communities with diverse backgrounds) to investigate whether the seven enabling factors identified in this study are applicable beyond the micro scale. For example, are successful PES schemes using some form of these factors, and are there other factors not identified here? How can the seven factors identified in this study inform PES development and management at the macro scale? These could be combined with other research to advance the field. This part of the study informs the role PES could play at a community level, as well as opportunities, challenges, and constraints expressed by local community members and various other stakeholders in environmental management in Rwanda. The second contribution is practical and informs best practices to put in place in order to achieve a sustainable and successful PES scheme geared towards improving the socio-economic wellbeing of communities within proximity of a PA, while ensuring effectiveness in PA management.

Limitations

While the research results show the potential role of using PES in PA management and socio-economic development, it is important to note that the results are based on one study from GMNP in Rwanda—a new PA with a history of subsistence farmers and former refugees who previously were given land by the government for agriculture in the forest. Removing these people and extending park boundaries to the extent that some community members within proximity of the PA are restricted in the use of their lands could be unique for this study area and could have a major impact on the planning and implementing of a PES scheme. However, the study provides a

lens to use when exploring various PES contributing factors to identify, engage and motivate stakeholders in a PES scheme. This approach to socio-economic development of local communities and PA management could be explored in the case of various ecosystems that are not necessarily forested or protected and where local communities do not necessarily rely directly on natural resources. The approach used for this study could be used in various other settings, even though the approach could yield results that are different from this study. The importance lies in understanding how PES can serve to manage ecosystems while it improves the socio-economic wellbeing of those who benefit from those ecosystems.

Due to limited resources, only 120 households in four communities located within five kilometers participated in this study. While Hartter (2009) mentioned that five kilometers from a PA is a distance long enough to study the impact of the PA to the neighboring communities, it would have been beneficial to expand the study area to the communities located beyond five kilometers from the PA. Limited resources was a factor in the time spent in the four studied communities. I recognize that as my research assistants and myself were outsiders, we would have benefitted from spending more time in the four communities to build more trust. While such was potentially a problem, I and my research assistants spent as much time as we could with study participants and we benefitted from both local leaders and the community conservation volunteers from the FHA who introduced us in the communities.

It is also important to highlight that as outsiders, our presence may have influenced how participants responded to various questions used for data collection. However, we strived to build trust and relationships, and ask clearly questions. By converging data from various instruments used in data collection, I hope I minimized the potential for false information from participants as

well as biases from my research assistants and myself. Surveys, interviews and focus groups allowed triangulating information and likewise reduced the risk of false information.

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Chapter 5: Conclusion

A large proportion of participants in this study were poor, with 68% being farmers, and among them, 60% having between 0 to 0.5 hectares of land to practice their farming activities. Their average income was 251,853 Rwf (295 USD) at the time of the study. Correspondingly, the findings show a high demand for natural resources to meet basic livelihood for large families (average household size of 6 people). Such demand is one of the major sources of conflicts between PA management and socioeconomic wellbeing, which has challenged biodiversity conservation effectiveness.

This study shows that approaches to PA management affect the socioeconomic wellbeing of people and affect how communities participate in activities that benefit PAs. Before the gazettement of GMNP, the studied population affirmed easy access to the resources from the park needed to meet the basic needs of their daily lives. In this study, meeting their livelihood by using resources from the park was correlated with positive perceptions about living in the proximities of the forest. Findings reveal that since the Gishwati forest became a PA with an increase in guards that patrol the forest and the restriction in accessing park resources, the studied population expressed negative perceptions about the PA management approach currently in place. Taking into consideration the socioeconomic status of the studied communities, this study suggests a PA management framework that emphasizes 1) benefits from PAs needed by local communities, 2) a partial "fence and fine" PA management that grant to some extent local communities the access to the park, and 3) a focus on capitalizing human connection with nature.

In order to improve the socioeconomic wellbeing of local communities while achieving effectiveness in PA management, environmental markets such as PES could play a significant role. The findings show the importance of PES enabling factors such as income, community advocacy,

social cohesions, land-use change, community advocacy, and local and country governance structures. While PES could improve the socioeconomic wellbeing of communities, hence creating positive perceptions from local communities about PA management, findings show that such schemes are not enough to change local communities' behaviors towards PAs. The study shows a need for education and training to assist local communities in understanding benefits associated with caring for nature, especially biodiversity under protection.

In addition to the education and training, active engagement of local communities and other stakeholders in PES planning and implementation is essential for a successful PES scheme. Further studies are needed to explore the best ways that key stakeholders in a PES scheme can work together to ensure maximum participation, and how to keep everyone invested during the lifetime of the scheme. While community participation is vital in PA management effectiveness, there is a need to understand how non-in-country stakeholders can collaborate with local people and what governance approaches to adopt for a successful implementation of a PES project.

Due to the limited resources that were available for this research, results are to be interpreted only as a case study. It is essential to highlight that this research focused only on four communities located within 5km of GMNP. While it has been mentioned that 5km is an adequate distance within which to study the socioeconomic relationships of forest and communities and that communities farther from the forest may impact this national park, this study recommends the exploration of identified factors that enable a successful PES to communities settled beyond 5Km from the Park edges. More studies are needed to explore further the role of socioeconomic wellbeing in influencing people's perceptions of various PA management approaches. Such studies could guide policymakers and government officials on directions to take to assist

communities around PAs to improve their wellbeing without jeopardizing biodiversity conservation.

This research shows the role of socio-economic wellbeing in shaping behaviors that could benefit biodiversity conservation. It shows also the importance of fostering local communities' positive perceptions about PA management and how PES schemes could assist in achieving both effectiveness in PA management and socio-economic wellbeing of local communities. These are a notable addition to the literature that I hope will be explored by continuing research on PAs and socioeconomic wellbeing.

Appendices

Appendix 1. Informed consent form

Informed consent form

Study Title: **Assessing the relationship between ecosystem services and socioeconomic wellbeing of communities. Does payment for ecosystem services matter?**

Researcher: Yves P. Gakunde, Antioch University New England, USA and University of Rwanda

Purpose.

The goal of this study is to assess the role "Payment for Ecosystem Services" (PES) may have to protect Gishwati-Mukura National Park and to improve the life of the people that live near the park. PES is a conservation approach where land users, who are often poor, receive incentives from ecosystem services buyers to continue to protect ecosystem services on their land and on the public land, such as in the case of protected areas (PAs). For example: Ecosystem services are the forests, water, wild animals and air that help people and communities live. Payment for these services will maintain a healthy environment.

Taking part in this study is voluntary.

You are not required to participate in any part of this study. You may stop participating in this study at any time without penalty.

There are no major risks involved in taking part in this study.

Talking about the topic could upset participants. This study is designed to protect participants and to give you opportunities to express your emotional responses.

Procedures.

If you decide to be part of this research, you will be interviewed for about 45-60 minutes. During the interview, we will ask you questions and note down your answers. We also will audio record your responses while you take part in the discussion and may take pictures of you, as well. The questions you will be asked are related to your use of Gishwati-Mukura National Park, along with your occupation, education, income and other background information.

Benefits.

Your community will receive the compiled results of the 30 households interviewed here. The information that we collect could be used to protect and run Gishwati-Mukura National Park, while increasing jobs, income and education for people living near the park. This research work will have three publishable papers. These papers will explain how the forests, water, wild animals, and air help people living in the area; how paying community members for these services works; and how the program "Payment for Ecosystem Services" can protect the park and still increase jobs, income and education for people living in the area.

I and my team will guard your confidentiality.

Your identity will be kept confidential, meaning your identity will not be revealed in any of the public documents related to the research. Your name will not appear in the research report or anywhere. We also will not share with anyone the information obtained from you, and we will

destroy the information collected after three years. We also will respect your privacy, as well as your cultural beliefs and values. Only you will be interviewed in your household.

You do not have to answer any questions you do not wish to answer.
Research records will be kept in a locked file; only I and my team will have access to the records. If we tape-record the interview, we will destroy the tape after it has been transcribed, which we anticipate will be within three months of its taping.

If you have questions about the research, call Yves P. Gakunde at xxxxxxxxx or xxxxxxxxx or email me at . If you have any questions or concerns about your rights as a participant in this research, you may contact xxxxxxxxx, Director of Research, College of Science and Technology, University of Rwanda at xxxxxxxxx or at xxxxxxxxx. You also may address questions or concerns about your rights as a participant to xxxxxxxxx, Chair of the Antioch University New England Institutional Review Board (IRB), at xxxxxxxxx or at xxxxxxxxx; or to xxxxxxxxx, AUNE Provost & Campus CEO at xxxxxxxxx or xxxxxxxxx or at Antioch University New England, 40 Avon Street, Keene, NH, 03431.

Statement of consent.
I have read the above information and have received answers to any questions I asked. I am over 18 years of age, and my signature below indicates I have read all the above and understand the information provided. I consent to take part in the study.
Your Signature or Finger Print _____ Date _____

Your Name (printed) _____

In addition to agreeing to participate, I also consent to having the interview tape-recorded.

Your Signature or Finger Print _____ Date _____

Signature of person obtaining consent _____ Date _____

Printed name of person obtaining consent _____

This consent form will be kept by the researcher for at least three years beyond the end of the study.

Appendix 2: Survey questionnaire

Village: Date:
Name of interviewer(s): GPS Coordinates:
Interviewee identification code: Gender (Male, Female)
Age: Marital status (Single, Married, Divorced, Widow)

Socioeconomic Survey

1. **Household composition**

Status	Description	Age	Sex	Education level	Occupation	# of years in the same occupation	Income
Head of Household							
Spouse							
Member 1							
Member 2							
Member 3							
Member 4							
Member 5							
Member 6							
Member 7							
Member 8							
Member 9							
Member 10							

Description *– 1) Husband, 2) Wife, 3) Child, 4) Relative, 5) Orphan, 6) Visiting worker, 7) Dependent, 8) Female head*
Education Level *– 0) No formal education, 2) Primary, 3) Secondary, 4) College/university education*
Occupation *– 0) No work, 1) Farming-including subsistence, 2) Student, 3) Own business, 4) Wage labour, 5) Salaried employee, 6) Infant 7) Other – specify*

2. Assets

House materials for main dwelling (try to make discreet observations on approach)

Walls

1) Timber/poles	2) Brick	3) Other-specify

Floor

1) Timber/poles	2) Mud	3) Cement	4) Tiles/bricks

Roof

1) Thatch	2) Tiles	3) Iron Sheets	4) Plastic Sheeting

Do you own a bicycle? How many? How about any of the other items below?

1) Radio	2) Television	3) Telephone
4) Motorcycle	5) Pickup truck or car	6) None

Livestock assets

Do you have any animals amongst your household assets?

Livestock item	**Number**	**How much will you be willing to pay to have them?**
Goats/		
Sheep		
Pigs		
Chickens/ducks/ pigeons		
Rabbits		
Cows		
Dogs		
Other (please specify)		

3. Land resources – How much land do you have? What do you use it for?

Land type	Area (local unit)	What % is this of your total land holding?	If you did not have this land, how much would you be willing to pay to have it?

Land Type – 1) Natural forest/woodland, 2) Woodlot, 3) Arable, 4) Wetland, 5) Grassland Pasture, 6) Woodland/forest pasture, 7) Cash crop plantation

4. Do you own a woodlot? If woodlot is owned:

Species of tree	Area (Ha)	Purpose	If you did not own the woodlot how much would you be willing to pay to have it?

5. Validation questions and additional questions

How long have you been in this community? How long they have lived here next to the forest	1) Less than 1 year, 2) 1-5 years, 3) 5-10 years, 4) 10 years or more 1) Less than 1 year, 2) 1-5 years, 3) 5-10 years, 4) 10 years or more
Do you own the house, or are you renting?	
How many people live in your household?	
How many people in your household are currently in school?	
Do you currently have a job? If so, what is your job?	
On average, how much money do you make per month? Rwf 5,000-10,000 Rwf 10,001-20,000 Rwf 20,001-50,000 Rwf 50,001-above	
Do you have health insurance?	

Does everyone in your household have health insurance?	
If so, who pays for the health insurance?	
How much per month do you pay for health insurance?	
Do you own any land? If yes, how big is your piece of land?	
Did you buy the land or inherit it from your parents?	
If you own land, how far is your land from your house?	
Do you sell crops from your land? If so, what do you sell?	
If so, how much do you sell versus how much you retain for your household?	
Do you employ people to work on your land?	
If so, how many and how often?	
If so, how much do you pay them per day?	
In the last past five years, has your crop production increased or decreased?	
What do you think is the cause of this increase/decrease?	
If decreased, how much is the difference in monetary value?	
Do you practice irrigation methods on your land? If so what method(s) and how much you spend for such practice?	
Which months is food scarce or expensive? Do you know the reason why the food is scarce or expensive?	
When the food is scarce and expensive, what do you do to afford putting the food at the table?	

Appendix 3: Interview questionnaire

Forest resources

Questions	**Answers**
What forest resources do you need in your household and how much would you pay to receive each resource? What fraction of your household resources and income come from the forest?	A separate sheet will be used to record all the resources from the forest
How often do you need those resources?	A separate sheet will be used to record all the resources from the forest
How far do you have to travel to get those resources?	
Which of the following fuels do you use each week and how much? a) Wood b) Charcoal c) Electricity d) Paraffin e) Gas	
Since Gishwati and Mukura forest became a National Park, do you think there has been a reduction in hunting and wood cutting in the park? If yes, do you think this is because (include all that apply): a) the presence of park guards increased, Y/N b) local leaders (e.g. cell executive) have instructed people not to go into the park, Y/N c) people need less resources from the park because alternatives are available, Y/N d) people are busier and no longer have as much time to enter the park for hunting and gathering, Y/N e) people have been told that if they go to the park less, a new project will come that will pay them money, Y/N f) people are better educated about the importance of the park, Y/N	

g) fewer people are coming from neighboring cells to collect things in the park, Y/N h) Other (please explain)	
Any challenges in getting from the park resources you need? If yes what are those challenges? If yes how can those challenges be resolved?	
Do you use the forest for any ritual practices? If so what practices and what resources you use for each ritual?	
How much would you be willing to pay to use those resources?	
Do you know any conflicts between members of your community and the management of the park? If so tell us more.	

PES if any

Questions	**Answers**
What resources related to the forest do you need but can't find?	
Why are those resources not available?	
In relation to the resources you obtain from the forest, what alternative resources would you like to have?	
What resources do you think would increase your socioeconomic wellbeing?	
If you received cash or in kind payment, would you participate in biodiversity conservation?	
If paid, what activities do you think you might do to protect the park?	
If so, how much would motivate you to engage in protecting the park? Rwf 5,000-10,000 Rwf 10,001-20,000 Rwf 20,001-50,000 Rwf 50,001-above	
For how long would you require payment? And, how often would you need to be paid?	

Who do you think should be paying for the services received from the park?	
Why do you think those people should pay?	
Who do you think should be paid?	
Why do you think these people should be paid?	
What do you think local leaders should do to assist you with improving your socioeconomic wellbeing?	
What changes do you think should be made to accommodate your lifestyle and help you meet your needs?	
Would you be willing to pay a fee to help with the protection of Gishwati-Mukura National Park? If so how much/month?	
Would you be willing to volunteer in activities that benefit the Gishwati-Mukura National Park? If so what activities?	
What are things if you had them would make your life better and then motivate you to engage in the protection of Gishwati-Mukura National Park?	
Are you aware of any policies or rules that forbid you to use the forest? If yes what are they and how did you hear about them?	
Would you need any form of payments or other type of incentives to observe these policies and rules? If so how much and how often would you require the payment?	
Do local leaders organize meetings and talk about the protection of Gishwati-Mukura National Park? If yes what are some of things they said you remember?	
Do you think there should be more meetings focusing on the protection of Gishwati-Mukura National Park? If so who do you think should organize them and how often these meetings should take place?	
Who are the people would you like to see involved in meetings and activities targeting the Gishwati-Mukura National Park?	
Do you feel like you have given opportunities to engage in the management of the Gishwati-Mukura National Park? If so can you give an example of how you are involved? If not, do you think this is a problem for you? Do you think your involvement will help you in any ways?	

Do local leaders and park managers invite you to the meetings? If so where the meetings are often being held? If so, how often and for how long are the meetings? If so, what do you usually talk about during the meeting?	

Do you have any questions for us?

Forest resources data recording instrument

Name of the resource	**Quantity**	**Frequency**	**How much would you be willing to pay in order to have them?**

Appendix translated in Kinyarwanda (local language)

Umugereka wa 1. Inyandiko yo gutanga uburenganzira bwo kubazwa

Inyito y'inyigo: Gusesengura isano hagati ya serivisi zo gusigasira indiri y'urusobe rw'ibinyabuzima n'imibereho myiza y'umuryango mu mibanire n'ubukungu. Ese ubwishyu bwa serivisi zo gusigasira indiri y'urusobe rw'ibinyabuzima hari icyo bumaze?

Umushakashatsi: Yves P. Gakunde, Kaminuza ya Antioch New Engalnd, Amerika na Kaminza y' U Rwanda

Ikigamijwe.

Iyi nyigo igamije gusesengura uruhare rw'"Ubwishyu bwa serivisi zo gusigasira indiri y'urusobe rw'ibinyabuzima" (PES), hagamijwe kurinda Pariki y'Igihugu ya Gishwati-Mukura, no kuzamura imibereho y'abatuye hafi yayo. PES ni uburyo bwo kurinda bugenera abakoresha ubutaka bakennye, agahimbazamusyi gaturutse ku mirimo yishyurwa na serivisi zo mu ndiri y'urusobe rw'ibinyabuzima kugira ngo bakomeze kurinda izo serivisi ku butaka bwabo no ku butaka rusange, nk'ahantu habungabunzwe (PAs). Urugero: Indiri y'urusobe rw'ibinyabuzima igizwe n'amashyamba, amazi, inyamaswa z'agasozi, n'umwuka utuma abantu n'imiryango babaho. Ubwishyu bwa serivisi zikorerwa muri urwo rusobe busigasira ubusugire bw'ibidukikije.

Kugira uruhare muri iyi nyigo bikorwa ku bushake.

Ntutegetswe kugira uruhare mu gice icyo ari cyo cyose cy' ubu bushakashatsi. Ushobora no guhagarika uruhare wagiraga muri ubu bushakashatsi igihe cyose ubishakiye nta nkurikizi.

Nta nkurikizi zaturuka ku kugira uruhare muri ubu bushakashatsi.

Kuvuga kuri iyi ngingo bishobora kubangamira bamwe. Iyi nyigo igamije kurinda abayigiramo uruhare no kubaha umwanya wo kugaragaza amarangamutima yanyu.

Imigendekere y'ibikorwa.

Niba wiyemeje kuzagira uruhare muri ubu bushakashatsi, tuzagirana ikiganiro kiri hagati y'iminota 45 na 60. Muri icyo kiganiro tuzakubaza ibibazo ari nako twandika ibisubizo uduha. Tuzanafata amajwi y'ibisubizo uzatanga, dufate n'amafoto. Ibibazo uzabazwa bijyanye n'uburyo ukoresha Pariki y'Igihugu ya Gishwati-Mukura, hagendewe ku kazi ukora, ku cyiciro cy'amashuri wize, ku cyo winjiza no ku yandi makuru akwerekeyeho.

Inyungu.

Aho mutuye tuzahageza ibyavuye mu biganiro twagiranye n'imiryango 30 twaganiriye nayo. Amakuru dukusanya ashobora kuzakoreshwa mu kurinda no kwita kuri Pariki ya Gishwati-Mukura, hongerwa imirimo n' uburezi ku baturage baturiye ibyo byanya. Ubu bushakashatsi buzavamo inyandiko eshatu zizatangazwa. Izo nyandiko zizasobanura uburyo amashyamba, amazi, inyamaswa, n'umwuka bifasha abantu kubaho muri ako gace; uburyo kwishyura abatuye muri ako gace imirimo irebana nabyo bigenda, n'uburyo gahunda yo "kwishyura serivisi zo gusigasira indiri y'urusobe rw'ibinyabuzima" yafasha pariki, kandi ikongera imirimo mu gace, ikongera icyo abahatuye binjiza n'uburezi babona muri ako gace.

Njye n'itsinda dukorana tuzabika ibanga ryanyu.

Umwirondoro wanyu uzagirwa ibanga; ibi bivuze ko umwirondoro ntaho uzagaragara mu nyandiko zizatangazwa zigendanye n'ubushakashatsi. Amazina yanyu ntazashyirwa muri raporo y'ubushakashatsi nta n'ahandi tuzayagaragaza. Nta muntu wundi tuzasangiza amakuru waduhaye, kandi nyuma y'imyaka itatu ibyo waduhereyeho amakuru tuzabisenya. Tuzubahiriza kandi ibanga ryawe, n'imyemerere yawe cyangwa indangagaciro ugenderaho. Tuzakuganiriza tugusanze iwawe gusa.

Si ngombwa gusubiza ikibazo utifuza gusubiza.
Amajwi yafashwe azabikwa mu ibanga. Uretse njye n'itsinda dukorana nta wundi uzaba ushobora kuyageraho. Nidufata amajwi mu kiganiro, tuzayasiba nyuma y'uko tumaze gushyira mu nyandiko ibyo twaganiriye. Ibi turateganya ko bizakorwa mu gihe kitarenze amezi atatu uhereye igihe twafatiye ayo majwi.

Niba hari ikibazo ufite ku bushakashatsi, hamagara Yves P. Gakunde at xxxxxxxxx cyangwa xxxxxxxxx cyangwa umwohereze ubutumwa kuri xxxxxxxxx. Niba hari icyo ushaka kubaza cyangwa ikibazo ugize ku burenganzira bwawe muri ubu bushakashatsi, wahamagara xxxxxxxxx, Umuyobozi w'Ishami ry'Ubushakashatsi muri Kaminuza y'u Rwanda, kuri telefone nomero xxxxxxxxx cyangwa ukamwandikira kuri xxxxxxxxx. Ushobora no kubaza ku bigendanye n'uburenganzira bwawe nk'uwagize uruhare muri ubu bushakashatsi xxxxxxxxx, Umukuru w'Inteko yo kunoza ubushakashatsi (IRB) muri Kaminuza ya Antioch New England kuri xxxxxxxxx cyangwa ukamwandikira kuri xxxxxxxxx; cyangwa se ukabaza xxxxxxxxx, Umuyobozi Mukuru wa Kaminuza ya Antioch New England kuri xxxxxxxxx wanamwandikira kuri xxxxxxxxx, ushobora no kunyuza ubutumwa kuri Kaminuza ya Antioch New England, 40 Avon Street, Keene, NH, 03431.

Imiterere y'inyandiko itanga uburenganzira
Nasomye amakuru atangwa haruguru, nanasubijwe ibibazo nabajije. Ndi hejuru y'imyaka 18, umukono wanjye uragaragaza ko nasomye ibyavuzwe haruguru byose kandi nkaba numvise neza amakuru yatanzwe. Nemeye kugira uruhare muri ubu bushakashatsi.

Umukono cyangwa igikumwe cyawe _____ Itariki _____

Amazina (Mu nyuguti nkuru) _____

Nyuma yo kwemera kugira uruhare mu bushakashatsi, nemeye kandi ko nafatwa amajwi mu biganiro tuzagirana.

Umukono cyangwa igikumwe cyawe _____ Itariki _____

Umukono w'uwakiriye inyandiko itanga uburenganzira _____Itariki _____

Amazina y'uwakiriye inyandiko itanga uburenganzira (mu nyuguti nkuru) _____

Iyi nyandiko izabikwa n'umushakashatsi byibura, mu gihe cy'imyaka itatu, ubushakashatsi burangiye.

Umugereka wa 2: Ibibazo bigenga ikiganiro

Umudugudu: Itariki:

Amazina y'ubazwa/ababazwa: Ibipimo bya GPS:

Nomero iranga ubazwa: Igitsina (Gabo, Gore)

Imyaka: Irangamimerere (Ingaragu, arubatse, baratandukanye, yarapfakaye)

Inyigo ku ngengamibanire n'ubukungu

1. **Abagize umuryango**

Imiterere y'abagize umuryango	Ibisobanuro	Imyaka	Igitsina	Icyiciro cy'amashuri	Icyo bakora	# Igihe amaze akora ako kazi	Icyo yinjiz
Umukuru w'umuryango							
Uwo bashakanye							
Ugize umuryango wa 1							
Ugize umuryango wa 2							
Ugize umuryango wa 3							
Ugize umuryango wa 4							
Ugize umuryango wa 5							
Ugize umuryango wa 6							
Ugize umuryango wa 7							
Ugize umuryango wa 8							
Ugize umuryango wa 9							
Ugize umuryango wa 10							

Ibisobanuro *– 1) Umugabo, 2) Umugore, 3) Umwana, 4) Uwo bafitanye isano, 5) Imfubyi, 6) Uhaba waje gukora, 7) uwo bafasha, 8) Umukuru w'umuryango w'umugore*

Icyiciro cy'amashuri *– 0) Ntayo, 2) Amashuri abanza, 3)Amashuri yisumbuye, 4) Amashuri makuru/kaminuza*

Icyo akora *– 0) Nta kazi, 1) Umuhinzi ngandura-rugo, 2) Umunyeshuri, 3) Rwiyemezamirimo, 4) Nyakabyizi, 5) Umukozi uhemberwa*

ukwezi, 6) Umwana, 7) Ikindi – sobanura

2. Umutungo

Ibigize inzu nini babamo(Gerageza gukoresha uburyo bwo kwitegereza mu ibanga)

Inkuta

1) Ibiti	2) Amatafari	3) Ikindi-sobanura

Hasi

1) Ibiti	2) Igitaka	3) Isima	4) Amakaro/Amatafari

Igisenge

1) Itwikirije ibyatsi	2) Amategura	3) Amabati y'ibyuma	4) Amabati ya purasitike

Mutunze igare? Angahe? Ni ibihe bindi muri bikoresho mutunze?

1) Radiyo	2) Televiziyo	3) Telefone
4) Moto	5) Imodoka cyangwa Pickup	6) Nta na kimwe

Amatungo

Hari amwe muri aya matungo mufite mu mutungo wanyu?

Amatungo	**Ingano**	**Wakwifuza kwishyura angahe ngo ubone iri tungo?**
Ihene/		
Intama		
Ingurube		
Inkoko/imbata/inuma		
Inkwavu		
inka		
Imbwa		
Ayandi (yagaragaze)		

3. Umutungo w'ubutaka – Mufite ubutaka bungana iki? Mubukoresha iki?

Imiterere y'ubutaka	**Inganoy'ahantu (Ha)**	**Buri kurihe % ugereranyije n'ubutaka bwose utunze?**	**Iyo uba udafite ubu butaka, wumva wari kwishyura angahe ngo ushobora kububona?**

Imiterere y'ubutaka – 1) Ishyamba kimeza/ ubutaka burimo ibiti, 2) Ahagenewe guterwa ishyamba 3) Ahagenewe guhingwa imyaka, 4) Igishanga, 5) Urwuri rw'ibyatsi, 6) Urwuri rw'ibiti, 7) Ahahingwa imyaka ngengabukungu

4. Ufite ahantu hagenewe guterwa ishyamba? Mu gihe hahari:

Garagaza ibiti birimo	**Ingano y'ahantu (Ha)**	**Icyo hamaze**	**Niba nta hantu ufite hagenewe guterwa ishyamba, wumva wakwishyura amafaranga angahe ngo uhabone?**

5. Ibibazo bishimangira ibyavuzwe n'iby'inyongera

Umaze igihe kingana iki utuye hano?	1) Mu nsi y'umwaka 1, 2) hagati y'umwaka 1n'5, 3) hagati y'imyaka 5 n'10 , 4) Imyaka10 kuzamura
Warahubatse cyangwa urakodesha?	
Utunze abantu bangahe iwawe?	
Mu bantu baba iwawe, ni bangahe bakiri mu mashuri?	
Ubu ufite akazi? Niba ugafite, ni akahe?	
Ugereranyije, winjiza amafaranga angahe buri kwezi?	

Rwf 5,000-10,000 Rwf 10,001-20,000 Rwf 20,001-50,000 Rwf 50,001-no hejuru	
Ufite ubwishingizi mu kwivuza?	
Buri muntu uba iwawe afite ubwishingizi mu kwivuza?	
Niba ari byo, ninde wishyura ubwo bwishingizi?	
Buri kwezi wishyura amafaranga angahe y'ubwishingizi?	
Hari ubutaka bwawe ufite? Bungana iki?	
Ubutaka warabuguze cyangwa wabuhawe n'ababyeyi?	
Niba utunze ubutaka, buherereye he ugereranyije n'aho utuye?	
Ese ugurisha imyaka yavuye mu butaka bwawe? Niba ari byo, ni iyihe myaka ugurisha?	
Niba ari byo, ugurisha ibingana iki ugereranyije n'ibyo usigarana bitunga urugo rwawe?	
Ujya ukoresha abandi bantu mu mirima yawe?	
Niba ari byo, ukoresha abantu bangahe, inshuri zingahe?	
Niba ari byo, Ubahemba angahe ku munsi?	
Mu myaka itanu ishize, ese umusaruro wawe wariyongereye cyangwa waragabanutse?	
Ukeka ko uko kwiyongera cyangwa kugabanuka kwatewe n'iki?	
Niba umusaruro waragabanutse, ni ku kigero kingana iki ubishyize mu mafaranga?	
Ukoresha uburyo bwo kurwanya isuri mu butaka bwawe? Niba ubukoresha ni ubuhe buryoukoresha? Bigutwara amafaranga angana iki?	
Ni ryari ibiribwa biba bike cyangwa bigahenda? Ese waba uzi impamvu ibiribwa biba bike cyangwa bikazamura ibiciro?	
Iyo ibiribwa byabuze byanahenze, ukora iki ngo ubashe kubona ibyo uteka?	

Umugereka wa 3: Ibibazo bigenga ikiganiro (2) (Bishingiye ku biri muri Bush, 2009

Ubukungu bw'ishyamba

Ibibazo	**Ibisubizo**
Ni ibihe bintu bitutuka ku ishyamba ukenera mu rugo rwawe, buri kimwe muri ibyo ukishyura angahe? Nu uwuhe mugabana w'urugo rwawe cyangwa ni ingano y' ibyinjira mu rugo rwawe bikomotse ku mashyamba?	Harakoreshwa urupapuro rwihariye mu kwandika ibintu byose bituruka ku ishyamba
Ubikenera inshuro zingahe?	Harakoreshwa urupapuro rwihariye mu kwandika ibintu byose bituruka ku ishyamba
Ukora urugendo rungana iki ujya kubishaka?	
Ni ibihe muri ibi bitwikwa ukoresha buri cyumweru, ese bigura angahe? b) Inkwi b) Amakara c) Umuriro d) Parafini e) Gaze	
Kuva ishyamba rya Gishwati na Mukuru byagirwa Pariki y'Igihugu, ese ubona guhiga no gutema ibiti byaragabanutse muri iyo Pariki? Niba ari ko ubibona, Ukeka impamvu ari iyihe (Garagaza ibisubizo byose bishoboka): a) umubare w'abarinda pariki wariyongereye, Yego/Oya b) abayobozi b'inzego z'ibanze (urugero. Gitifu w'akagari) batanze amabwiriza yo kutajya muri pariki, Yego/Oya c) abantu bakenera ibintu bike bituruka muri Pariki kuko habonetse ibibisimbura, Yego/Oya d) abantu barahuze, ntibakibona umwaka wo kwinjira muri Pariki ngo bage guhiga no gutashya, Yego/Oya e) abantu babwiwe ko nibagabanya kujya mur Pariki, bazashyirirwaho imishinga mishya izajya ibishyura amafaranga, Yego/Oya	

f) abantu barushijejo gusobanukirwa akamaro ka Parike, Yego/Oya g) hari abantu bake bo mu tugari duhana imbibi bakiza gushaka ibintu muri Pariki, Yego/Oya h) Ibindi bitavuzwe haruguru	
Haba hari imbogamizi zihari mu kubona ibyo bintu?	
Ese hari imihango mukorera mu ishyamba? Niba ihari ni iyihe mihango ikorerwamo n'ibihe bikoresho mukoresha kuri buri muhango?	
Wumva wakwishyura iki kugira ngo ukoreshe ibyo bikoresho?	
Haba hari amakimbirane waba uzi yabaye hagati y'abo muturanye n'abarinda pariki? Niba hari ayo uzi, yatubwireho.	

PES, niba hari ihari

Ibibazo	**Ibisubizo**
Ni ibihe bikoresho biboneka mu ishyamba mukenera ariko ntimubibone?	
Kuki ibyo bikoresho bitaboneka?	
Mugendeye ku bikoresho mukura mu ishyamba, mwumva ari ibihe bikoresho mwifuza byabisimbura?	
Ni ibihe bikoresho mwumva byazamura imibereho myiza yanyu mu mibanire n'ubukungu?	
Uramutse uhawe amafaranga cyangwa ubundi bufasha, wagira uruhare mu kurinda ubusugire bw'ibidukikije?	

Uramutse ubiherewe amafaranga, ni ibihe bikorwa wakora mu kurinda pariki?	
Niba ari uko bimeze, ni iyihe ngano y'amafaranga yagutera ishyaka ryo kurinda pariki? Rwf 5,000-10,000 Rwf 10,001-20,000 Rwf 20,001-50,000 Rwf 50,001-Gusubiza Hejuru	
Ni mu gihe kingana iki wakenera ubwo bwishyu? Ese wakenera ko bukugeraho mu gihe kingana iki? Inshuro zingahe ku mwaka?	
Ni nde wumva ukwiye kwishyura serivisi zitangwa muri pariki?	
Kuki wumva aba bantu bagakwiye kuba bishyura?	
Ni bande wumva bakwiye kwishyurwa?	
Kuki wumva aba bantu bagakwiye kuba bishyurwa?	
Ni iki wumva abayobozi bo mu nzego z'ibanze babafasha ngo bateze imbere imibereho myiza yanyu haba mu mibanire n'ubukungu?	
Ni izihe mpinduka mutekereza ko zikenewe ngo munogerwa mu buzima mubayemo, mubone n'ibintu mukenera kenshi?	
Waba wifuza kuba watanga ikiguzi ngo ufashe mu gusigasira pariki ya Gishwati-Mukura? Niba ubyifuza, wumva watanga angahe ku kwezi?	
Wifuza kuba umukorera bushake mu mirimo ifitiye inyungu Pariki ya Gishwati-Mukura? Niba ubyifuza, wumva wakora iki?	
Ni ibiki wumva waba ufite ubuzima bwawe bukaba bwiza, bityo bikagutera imbaraga zo kugira uruhare mu kurinda Pariki ya Gishwati-Mukura?	
Haba hari politiki cyangwa amabwiriza uzi akubuza gukoresha ishyamba? Niba hari uzi ni ayahe, ese wayamenye ute?	
Haba hari ubwishyu cyangwa akandi gahimbazamusyi ukeneye kugira ngo wubahirizi izo politkiye n'amabwiriza? Niba ari uko ubibona se wumva wakwishyurwa angahe mu gihe kingana iki?	

Inzego z'ibanze zijya zitegura inama mukavuga ku kurinda pariki ya Gishwati-Mukura? Niba bibaho, ni ibi wibuba bavuze?	
Urakeka ko hazabaho izindi nama zivuga by'umwihariko ku kurinda Pariki ya Gishwati-Mukura? Niba ariko ubitekereza, wumva ari nde uzatumiza izo nama, ese zizajya ziba inshuro zingahe?	
Ni abahe bantu wifuza ko bagira uruhare mu gutegura inama n'ibikorwa bifitiye akamaro Pariki ya Gishwati-Mukura?	
Ukeka ko wahawe umwanya wo kugira uruhare mu gucunga Pariki ya Gishwati-Mukura? Niba warawuhawe, watanga urugero? Niba ntawo wahawe, ukeka ko ari ikibazo kiguturukaho? Ukeka ko uruhare rwawe hari icyo rwagufasha mu buryo ubwo ari bwo bwos?	
Ese abayobozi b'inzego z'ibanze n'abashinzwe gucunga pariki bajya babatumira mu nama? Niba babatumira,inama zibera he akenshi? Niba babatumira, ni kangahe, ese inama zimara igihe kingana iki? Niba babatumira, ni iki mukunze kuganiraho mu gihe cy'inama?	

Hari ikibazo wifuza kutubaza?

Ilisiti yifashishwa mu gufata amakuru ku bikoresho bituruka mu ishyamba

Izina ry'igikoresho	ingano	inshuro	Wumva wakwishyura angahe ngo ushobore kubona icyo gikoresho?